CIGRE Session 2022

28 August - 02 September 2022
Paris, France

Technical Programme

See the list of Accepted Papers based on synopses and Full Papers peer- review.

A1 - ROTATING ELECTRICAL MACHINES

PS 1 Generation Mix of the Future

ID: 10244
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS1 - Generation Mix of the Future
Keywords: flexible coal-fired, power system

Performance Evaluation of Retrofitted Coal-fired Power Plant Simulation Model

Bongil KOO, Suchul NAM, Baekkyoung KO, Sung-Bum KANG, Joon HAN, Karam HAN
Korea Electric Power Corporation Research Institute

ID: 10430
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS1 - Generation Mix of the Future

A challenge faced in India by the Peak Load Stations with Nation's commitment of massive penetration of Renewables in the Generation Mix

Ashutosh Kumar PANDEY
Power System Operation Corporation Limited

ID: 10431
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS1 - Generation Mix of the Future

Case Study for Synchronous condenser Implementation

R C JHA
NTPC Ltd.

ID: 10740
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS1 - Generation Mix of the Future
Keywords: renewable energy, motor-generator set (M-G set), storage battery, power system security, power system stability

New Proposal of the Motor-Generator Set with Renewable Energy and Storage Battery

Ren AOKI, Yoshihiro KITAUCHI
Central Research Institute of Electric Power Industry (CRIEPI)

ID: 10789
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS1 - Generation Mix of the Future
Keywords: Synchronous condenser, flywheel, augmented inertia, low frequency oscillations, power system stabilizer, wide area damping control

An innovative power system stabilization method with augmented inertia synchronous condensers

Cosimo PISANI, Giorgio GIANNUZZI, Francesco PALONE, Roberto ZAOTTINI, Roberto PUDDU, Benedetto ALUISIO
TERNA S.p.A. Italy

ID: 10834
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS1 - Generation Mix of the Future

Robust Design of Nuclear Turbo-generators and AVRs for increased penetration of renewables and HVDC lines in transmission grids

Hervé BIELLMANN[1], Mohamed BERRIRI[1], Arnaud BUGUIN[1], Stéphane BRAEM[2], Valentin COSTAN[2], Vincent FERNAGUT[2]
[1]General Electric; [2]EDF

PS 2 Asset Management of Electrical Machines

ID: 10114
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS2 - Asset Management of Electrical Machines
Keywords: Battery Energy Storage System; Fuzzy Logic Control; Matlab/Simulink, Subsynchronous Torque Oscillations.

Alleviation of Subsynchronous Torque Oscillations in Series Compensated Power Grid Via Fuzzy Based Battery Energy Storage System

Mohamed Fayez AHMAD
Cairo Electricity Production Company (CEPC) (EEHC)

ID: 10123
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS2 - Asset Management of Electrical Machines

Data Science and AI for On-line Diagnosis of Rotating Machines from Pre-existing Sensors, with applications in Hydro Generators and Wind Generators

M. E. G. ALVES[1], G. P. S. GOMES[1], M. M. PINTO[1], B. F. SARDINHA[1], H. P. SANTOS[1], L. P. FRITOLI[1], M. COSTA[1], D. P. SANTOS[1], D. L. A. NEGRÃO[2], G. TOYOSHIMA[2], Iony SIQUEIRA[3], R. A. FLAUZINO[4]
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ID: 10125
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS2 - Asset Management of Electrical Machines

Construction of the Partial Discharge Measurement History According to IEC 60034-27-2

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ID: 10310
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS2 - Asset Management of Electrical Machines
Keywords: Rotating machine, Insulation system, Thermal index, Ageing, Loss tangent, Partial discharge

Review on Trend of Diagnostic factor as a Function of Thermal and Multi Aging Time of 6.6 kV Rotating Machine Insulation System

S.C. HWANG, Y.H. KIM
HYUNDAI ELECTRIC & ENERGY SYSTEMS CO., LTD., Korea, Republic of (South Korea)

ID: 10355
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS2 - Asset Management of Electrical Machines

Features of Electromagnetic Processes and Force Interactions in Turbogenerators When Consuming Reactive Power

P.A. DERGACHEV, P.A. KURBATOV, E. KURBATOVA
NRU MPEI

ID: 10741
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS2 - Asset Management of Electrical Machines
Keywords: Turbine Generator, Rotor, Fatigue Failure, Preventive Maintenance, NDT

Preventive Maintenance Technology for Enhancement of Turbine Generator Reliability

Kazuaki OGURA, Go KAJIWARA, Kenji TANAKA
Mitsubishi Electric Corporation

ID: 10742
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS2 - Asset Management of Electrical Machines
Keywords: Generator, Stator Coil, Insulation, Partial Discharge, Online, Monitoring, Diagnosis, Isolated Phase Bus

On-line Partial Discharge Monitoring System for Diagnosis of Insulation Condition in Generators

Makoto TAKANEZAWA, Takashi HARAKAWA, Tomoaki TAKAHASHI, Abdullah AJLAN, Akira FUJIMOTO, Hideyuki NAKAMURA
TOSHIBA Energy Systems & Solutions Corporation

ID: 10862
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS2 - Asset Management of Electrical Machines

Automated tool for bearing fault diagnosis in induction motors, based on MCSA technique and machine learning algorithm

Guillem GIL-PRIETO[1], José A. ANTONINO-DAVIU[2], Daniel TARÍN-CABALLERO[1], Pascual MULLOR-RUIZ[1], Alfredo QUIJANO-LÓPEZ[2]
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ID: 10997
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS2 - Asset Management of Electrical Machines

Performance and Reliability of the Wind Turbines at Lam Takong Jolabha Vadhana Power Plant: A Review

Prapapong VANGTOOK, Panu SUWICHARCHERDCHOO
TNC-CIGRE, Thailand

ID: 11138
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS2 - Asset Management of Electrical Machines

Anomaly Detection in Regulation Ring from Bulb Turbines using Deep Learning

Yuri CROTTI[1], Marcos Hisashi Napoli NISHIOKA[1], Emerson Lima DO NASCIMENTO[1], Tiago Kaoro MATSUO[1], Weslen Silva dos SANTOS[2]
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PS 3 DEVELOPMENTS OF ROTATING ELECTRICAL MACHINES AND OPERATIONAL EXPERIENCE

ID: 10247
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS3 - Developments of Rotating Electrical Machines and Operational Experience

Research on Non-invasive Condition Monitoring-Based Predictive Maintenance of Electric Motors

Yuanqi TANG[1], Xianhe SHANG[2], Chenjun DAI[1]
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ID: 10353
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS3 - Developments of Rotating Electrical Machines and Operational Experience

Series of Powerful Water-cooled Turbine Generator

M.B. ROYTGARTS, O.V. ANTONYUK, A. VARLAMOV, N.V. GRISHIN, V.N. ZHELEZNYAK, D.V. ZHUKOV, A.G. MIGAS
JSC “Power machines”

ID: 10354
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS3 - Developments of Rotating Electrical Machines and Operational Experience

Features of Akkuyu NPP Turbogenerators and Factory Test Results

E. KADI-OGLY[1], A. TSVETKOV[1], B. WAHDAME[2], Ph. MEYER[2], P. CHAY[2], D. DE-ROZARIO[2]
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ID: 10432
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS3 - Developments of Rotating Electrical Machines and Operational Experience

Failure of Large Turbo-Generator during first run-Case Study of Indian Power Utility

Ravish Chandra JHA, Kondra NAGESH
NTPC Ltd.

ID: 10836
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS3 - Developments of Rotating Electrical Machines and Operational Experience
Keywords: Hydro Power, Flexibility, Hybrid, Wear and Tear, Ancillary Services

Increasing flexibility of historical power generation thanks to micro hybrid concept, the Xflex hydro live demonstrator at Vogelgrun HPP

Jean-Louis DROMMI[1], Gregory PAIS[2], Christian LANDRY[3], Christophe NICOLET[3]

[1]EDF; [2]CEA; [3]Power Vision Engineering Sarl, SUISSE

ID: 10863
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS3 - Developments of Rotating Electrical Machines and Operational Experience

Fundamental model of full power converter variable speed Hydro Generators: Control and Simulation

Luis ROUCO[1], Francisco J. PÉREZ-THODEN[1], Fernando PERÁN[2]
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ID: 11021
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS3 - Developments of Rotating Electrical Machines and Operational Experience

Damaged generator rotors: the economic and logistical benefits of repair over scrappage

Wojciech BETLEJ, Tony CROUCHER
Quartzelec Ltd

ID: 11063
A1 ROTATING ELECTRICAL MACHINES - Full Papers
Topics: PS3 - Developments of Rotating Electrical Machines and Operational Experience

Experience with CO2 free Generator Operation

Uwe EICKELBECK
Siemens Energy, Germany

A2 - POWER TRANSFORMERS AND REACTORS

PS 1 EXPERIENCE AND NEW REQUIREMENTS FOR TRANSFORMERS FOR RENEWABLE GENERATION

ID: 10100
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS1 - Experience and New Requirements for Transformers for Renewable Generation
Keywords: HVDC converter transformer, Condition assessment, Risk assessment, Diagnostics

Condition Assessment of HVDC converter transformers at limited time of outage applied to the Fenno–Skan transmission system

Evgenii ERMAKOV[1], Lena MELZER[1], Tomas LINDSTEDT[1], Niclas SCHÖNBORG[2], Gert-Ove PERSSON[2]
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ID: 10127
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS1 - Experience and New Requirements for Transformers for Renewable Generation

Advantages of Evaluation of the Loading and Ambient Temperature Profile for Solar Collector Power Transformer based on Dynamic Loading Mode

W CALIL[1], E COSTA[2], T LANERYD[3], A GUSTAFSON[3]
[1]Hitachi ABB Power Grids, Brazil; [2]São Paulo University,; [3]Hitachi ABB Power Grids, Sweden

ID: 10216
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS1 - Experience and New Requirements for Transformers for Renewable Generation
Keywords: microgrid, effective grounding, coefficient of grounding, inverter-based DERs, grounding transformer

New Method for Effective Grounding Design Using Grounding Transformer for the Microgrid with Inverter-based Distributed Energy Resources (DERs)

Aleksandar VUKOJEVIC[1], Paul PABST[1], Keith DSOUZA[2]
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ID: 10249
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS1 - Experience and New Requirements for Transformers for Renewable Generation

Investigations on Vacuum Tap Changer Failures of Converter Transformers and Maintenance Suggestions

Linjie ZHAO, Yao YUAN, Jiahui YANG, Xi ZHANG, Lianwei BAO
Electric Power Research Institute of China Southern Grid, China

ID: 10256
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS1 - Experience and New Requirements for Transformers for Renewable Generation

Reverse Power Flow Impacts for Legacy Power Transformers

Ed G. TENYENHUIS
Hitachi ABB Power Grids

ID: 10433
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS1 - Experience and New Requirements for Transformers for Renewable Generation

Design and Operation Consideration for Selection of Transformers for Solar Photovoltaic Plant Applications

Koushik DAS[1], Subir KARMAKAR[2]
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ID: 10771
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS1 - Experience and New Requirements for Transformers for Renewable Generation
Keywords: Reactive power compensation, thyristor controlled transformer, static var compensation, STATCOM, shunt reactors

Design of a 24-pulse 250 Mvar Thyristor Controlled Transformers

Luca BUONO[1], Enrico ROTOLO[1], Francesco PALONE[1], Lorenzo PAPI[1], Simone SACCO[1], Roberto SPEZIE[1], Luca LOMBINI[2], Dario ROGORA[2]
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ID: 10810
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS1 - Experience and New Requirements for Transformers for Renewable Generation

Evaluation and Implementation of HV Dry-Type Shunt Reactors into a 420kV Transmission Grid

Peter DOPLLMAIR[1], Klaus POINTNER[1], Peter VENEDIGER[2]
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ID: 10839
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS1 - Experience and New Requirements for Transformers for Renewable Generation
Keywords: power transformer, electrical and mechanical design, harmonics, vibration, maintenance

Design challenges for large offshore wind turbine transformers

Max GILLET[1], Christophe PERRIER[1], D MARNAY[1], F MARKETOS[1], M KAVUK[2], H YILDIZ[2], Tobias STIRL[3], T BOROOMAND[4]
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ID: 10884
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS1 - Experience and New Requirements for Transformers for Renewable Generation

Mobile Load Flow Reactor for 220kV

Klaus POINTNER[1], Peter DOPPLMAIR[1], Victor J. HERNANDES JIMENEZ[2], Klaus REISENBERGER[1], Taneli MONNI[1]
[1]Trench Austria Group; [2]RED Eléctrica de España

ID: 10943
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS1 - Experience and New Requirements for Transformers for Renewable Generation

1 Statistical Analysis and Grouping of Measured Power Transformer Overvoltages

Bruno JURIŠIĆ
HRO CIGRE, Croatia

ID: 10953
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS1 - Experience and New Requirements for Transformers for Renewable Generation

On-line differential partial discharge measurements of Condenser Bushings on Power Transformers

Espen EBERG[1], Lars LUNDGAARD[1], Asgeir MJELVE[2]
[1]SINTEF Energy Research; [2]Elvia

ID: 11065
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS1 - Experience and New Requirements for Transformers for Renewable Generation

Impact of Transient Voltage Generated by Valve Commutation on HVDC Transformer

Rene WIMMER[1], Thomas HAMMER[2]
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ID: 11139
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS1 - Experience and New Requirements for Transformers for Renewable Generation

Bubble Formation in Power Transformers – a Potential Risk for the Future Network Reliability?

Christian POESSNIKER
University of Exeter, Exeter, EX4 4PY United Kingdom

PS 2 BEYOND THE MINERAL OIL-IMMERSED TRANSFORMER AND REACTORS

ID: 10130
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors

A Proposal to Reduce Greenhouse Gas Emission in the Electricity Transmission Sector in Brazil: A Calculation Method based on the Use of Natural Ester in Power Transformers

R SILVA, R REINERT
Cargill

ID: 10277
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors

A new solution of higher energy-efficient dry-type transformers with Silicon Rubber Casting technology

Shaigen HAN[1], Jian WU[2], Yonghua JIN[3], Liingyu ZHANG[3], Yi YANG[4], Jian HAN[5]
[1]Energy Internet Research Institute Co., Ltd. of State Grid, China; [2]Jiangsu Dahang Transmission and Distribution Co., Ltd., China; [3]Shanghai Zhenger Intelligent Technology Co., Ltd., China; [4]International Copper Association, China; [5]Danyang Power Supply Branch of Jiangsu Electric Power Co., Ltd. of State Grid, China

ID: 10437
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors

Experience on Design, Manufacturing & Type Testing of First 420kV Class ester fluid filled shunt reactor

Gunjan AGRAWAL
Power Grid Corporation of India Ltd.

ID: 10505
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors

Beyond the top oil temperature limit

Tor LANERYD[1], G FRIMPONG[2], N LAVESSON[1], J CZYZEWSKI[3], L FERM[1]
[1]Hitachi Energy, Sweden; [2]Hitachi Energy, United States; [3]Hitachi Energy, Poland

ID: 10534
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors
Keywords: Gas filled transformer, Disk winding, Partial discharge, Alternative Gas, N2, Dry air

Winding Insulation Characteristics of Gas Filled Transformers with SF6 Alternative Gas

Yoshiki NAKAZAWA, Shigekazu MORI, Kei TAKANO, Naoki NOGUCHI, Takeshi CHIGIRI
Toshiba Energy Systems & Solutions Corporation

ID: 10535
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors

Technological Development of Vegetable Oil (Rapeseed Oil) Immersed Transformer

Susumu SAKAMOTO[1], Shin YAMADA[2]
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ID: 10688
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors

Development of Transformer using Natural Ester for a Modular Substation

Jaeyong PARK, Hyeon Gu JEONG, Min Gyu KIM, Seong Eon KIM, Jongchul JUNG, Ik Choon CHO, Jongung CHOI, Young Geun KIM
LS ELECTRIC, Republic of Korea

ID: 10772
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors
Keywords: Natural ester, water tolerance, oxidation stability, stray gassing, insulation system

Supporting development of transformers with natural esters by comprehensive evaluation of insulation systems

Fabio SCATIGGIO[1], Giorgio CAMPI[1], Evanne WANG[2], Radoslaw SZEWCYK[2]
[1]A&A Fratelli Parodi; [2]DuPont

ID: 10803
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors

420kV Shunt Reactors for Reactive Power Compensation Explaining the Trends Favoring Air-Core Dry-Type Technology

A. GAUN, A. GRISENTI, B. FRÖHLICH, C. NIEDERAUER
Coil Innovation GmbH

ID: 10864
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors

Dry-type 145 kV transformers: safe indoor substations with improved environmental performance

Carlos ROY[1], Rafael MURILLO[1], Lorena CEBRIÁN[1], Mariano BERROGAÍN[1], Jason L. BREWER[2], Jackson WILLIAMS[2]
[1]Hitachi Energy; [2]Duke Energy

ID: 11022
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors

Design of innovative resilient transformers for maximum operating flexibility

Radosław SZEWCZYK[1], Jean-Claude DUART[1], Anastasia O'MALLEY[2], Kurt KAINEDER[3], Robert MAYER[3], Ewald SCHWEIGER[3]
[1]DuPont; [2]Consolidated Edison Co. of NY; [3]Siemens Energy

ID: 11064
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors

Testing Challenges with Ester Insulating Liquids

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ID: 11066
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors

Qualification of Insulating Liquids for Power Transformers and Tap-Changers

Rainer FROTSCHER[1], Sebastian REHKOPF[2]
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ID: 11125
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors

Type Testing of 80MVA Power Transformer with a new Bio-based, Biodegradable and Low Viscosity Insulating liquid

C. P. WOLMARANS[1], Ahmed GAMIL[2]
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ID: 11140
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS2 - Beyond the Mineral Oil-Immersed Transformer and Reactors

Analysis of new dielectric fluid alternatives using the design of a thermal distribution test platform model and CFD methods.

Pedro José QUINTANILLA CAVIA[1], Agustin SANTISTEBAN DIAZ[1], Ramazan ALTAY[2], Alfredo ORTIZ FERNÁNDEZ[1]
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PS 3 BEST PRACTICES IN TRANSFORMERS AND REACTORS PROCUREMENT

ID: 10122
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS3 - Best Practices in Transformers and Reactors Procurement
Keywords: power transformers, on load tap changers, varistors, impulse test, IEEE C57.12.90

Impulse Testing of Power Transformers - Impact of Internal Varistors built into On-load Tap Changers

Dharam VIR, Pradeep RAMASWAMY, Yuriy FRADKIN, Tim ROCQUE
Prolec-GE Waukesha, Inc. USA

ID: 10131
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS3 - Best Practices in Transformers and Reactors Procurement

High Voltage Bushings For Transformers And Shunt Reactors Considering Local Conditions – Brazilian Transmission Network Case

S MONTENEGRO[1], N VIVEIROS[2], Y NOMI[3], R ASANO[4]
[1]CHESF; [2]SIEMENS-ENERGY; [3]HITACHI-ABB; [4]UFABC

ID: 10251
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS3 - Best Practices in Transformers and Reactors Procurement
Keywords: White-box model; Electromagnetic transients; Simulation

Validation of a White-box model of a Distribution Transformer through impulse voltage transfer measurements including non-standard test conditions

Luis BRAÑA[1,2], Artur COSTA[2], Ricardo LOPES[1]
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ID: 10314
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS3 - Best Practices in Transformers and Reactors Procurement
Keywords: low-Noise, Transformer, 154kV, 50dBA

Introduced the Development of low-Noise (50dBA) Technology for 154kV Class Power Transformers

Chuljun PARK, Kyuho LEE, Moonsik KANG
HYOSUNG Corporation, Korea, Republic of (South Korea)

ID: 10356
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS3 - Best Practices in Transformers and Reactors Procurement

White-box Models Development for Insulation Design and Providing Transformers Withstand to High-frequency Resonant Overvoltages

V.S. LARIN[1], D.A. MATVEEV[2], M.V. FROLOV[2]
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ID: 10436
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS3 - Best Practices in Transformers and Reactors Procurement

Complexities in Design and Manufacturing of Transformers with Low MVA, High Voltage Class

Harmanpreet Singh SEKHON
CG Power and Industrial Solutions Limited

ID: 10438
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS3 - Best Practices in Transformers and Reactors Procurement

Procurement of Transformers and Reactors-Best Practices Adopted to Achieve highest availability & reliability goal

Richik Manas DAS
Power Grid Corporation of India Ltd.

ID: 10506
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS3 - Best Practices in Transformers and Reactors Procurement

State of the art in short-circuit for transformers

Julia FORSLIN[1], J TILLERY[1], M MUNOZ[2], D SACCONE[3]
[1]Hitachi Energy, Sweden; [2]Hitachi Energy, Spain; [3]Hitachi Energy, Italy

ID: 10573
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS3 - Best Practices in Transformers and Reactors Procurement

Experiences and Risks when Dealing with Remote Inspections of Factory Acceptance Tests on EHV Inductive Equipment

Pablo Andrés NARVAEZ
INTERCONEXION ELECTRICA S.A E.S.P. - ISA

ID: 10840
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS3 - Best Practices in Transformers and Reactors Procurement
Keywords: Power transformer, Reactor, Qualification, Factory, Manufacturing

RTE's experience on transformers and reactors procurement

Laetitia MAUGAIN, Brice REDIN, Jean-Christophe RIBOUD
RTE

ID: 10841
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS3 - Best Practices in Transformers and Reactors Procurement

A simplified tool to assess transformer behaviour to GIC and other DC disturbances

Paul POUJADE, Damien BORTOLOTTI, Olivier MOREAU, Mohamed RYADI, Luc PAULHIAC
EDF

ID: 10842
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS3 - Best Practices in Transformers and Reactors Procurement
Keywords: GIC, back-to-back test, magnetic core, structural steel parts, DC component

Qualification test for power transformers GIC capability

Mohamed RYADI[1], Paul POUJADE[1], Damien BORTOLOTTI[1], Damien BORTOLOTTI[1], Olivier MOREAU[1], JT MONTAVONT[1], E ALVADO[1], J RAITH[2], C LEBER[2], M STOESSL[2]
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ID: 11059
A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS3 - Best Practices in Transformers and Reactors Procurement

A Case Study of Earth Fault on The Power Transformer Caused by Human Error and Inadequate Design in the Interlock System

Yousef MASHAGBEH[1], Sami ABU SHARAR[2]
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A2 POWER TRANSFORMERS AND REACTORS - Full Papers
Topics: PS3 - Best Practices in Transformers and Reactors Procurement

Procuring transformers and reactors under a dynamic environment for a sustainable network – the Eskom way

S. MTETWA
Eskom Holdings Limited

A3 - TRANSMISSION & DISTRIBUTION EQUIPMENT

PS 1 DECENTRALISATION OF T&D EQUIPMENT

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Topics: PS1 - Decentralisation of T&D Equipment

Results of Two-year Operation of 220 kV Pilot High Temperature Superconducting Fault Current Limiter (SFCL) in Moscow Power Grid

Petr USTYUZHANIN, Mikhail MOYZYKH, Sergey SAMOILENKOV, Eldar MAGOMMEDOV, Anastasiya TELNOVA, Lenar SABIROV, Kirill BABURIN
JSC “SuperOx“

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS1 - Decentralisation of T&D Equipment
Keywords: metal vapor deposition condensation evaporation surface resistance

Metal Vapor Deposition Patterns and Characteristics on Alumina Ceramic Insulators in Vacuum

Kip BENSON, Subir CHAKRABORTY, Leslie FALKINGHAM, Greg WILK, Gabrielle MADDEN, Francis GOTANCO
S&C Electric Company, United States of America

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Topics: PS1 - Decentralisation of T&D Equipment

Recent HVDC Circuit Breaker Development and Testing

N.A. BELDA[1], R.P.P. SMEETS[1], H. ITO[2], S. TOKOYODA[2], T. INAGAKI[2], S. NEE[3], T. MODEER[3], S. MEBREHATU[4], A. HASSANPOOR[4], C.A. PLET[5]
[1]KEMA Labs; [2]MITSUBISHI Electric; [3]SciBreak AB; [4]Hitachi ABB Power Grids; [5]DNV

ID: 10626
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS1 - Decentralisation of T&D Equipment
Keywords: Superconducting Fault Current Limiter, Resistive Fault Current Limiter, SFCL, Fault Current, Power System Interconnection

Development of a 22.9 kV/2,000 A Compact R-SFCL

Min Jee KIM, Sung Joon KIM, Gyeong Ho LEE, Chae Yoon BAE, Young-Geun KIM
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ID: 10655
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS1 - Decentralisation of T&D Equipment
Keywords: High voltage circuit breakers, dielectrics, RDDS, controlled switching

RDDS measurements for 245 kV and 420 kV High Voltage Circuit Breaker

Reto KARRER, M. DHOTRE, V. TEPPATI, S. KOTILAINEN, F. LUNDQVIST, F. AGOSTINI
Hitachi Energy Switzerland

ID: 10773
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS1 - Decentralisation of T&D Equipment
Keywords: HVDC, EHVDC-UHVDC, Disconnector, Switching impulse, Lightning Impulse

Sizing and testing of HVDC disconnectors from the dielectric point of view

Eros STELLA[1], Marco NOSILATI[1], Francisco CHACON[2], Alberto PIGINI[3]
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Topics: PS1 - Decentralisation of T&D Equipment

Short circuit analysis of a Doubly Fed Induction Generator and their Impact on Generator Circuit Breakers

Alois LECHNER[1], Karthikreddy VENNA[2], Hong URBANEK[2]
[1]Andritz Hydro GmbH; [2]Siemens AG Germany

ID: 10843
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS1 - Decentralisation of T&D Equipment
Keywords: Composite insulators, long-term experience, long-term test, HTV silicone, LSR silicone

Experience of composite insulators on HV substation: some French examples

Giulio ROCCHETTI[1], J SEIFERT[2], Minh NGUYEN[3], Christian PONS[4], Eric MOAK[5]
[1]REINHAUSEN RFE; [2]REINHAUSEN power composites RPC; [3]RTE; [4]EDF; [5]CAE Impuls'ions

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS1 - Decentralisation of T&D Equipment
Keywords: Instrument Transformer - Risk based policy - Oil - Paper - IT Failure - Reliability

Risk based replacement policy for RTE's instrument transformer (IT)

Mandana TALEB, S TAZI, Xavier GILLES, B IZAC, L COHEN
RTE

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Topics: PS1 - Decentralisation of T&D Equipment

Seismic performance of instrument transformers

Ivan ČEHIL
HRO CIGRE, Croatia

PS 2 DECARBONISATION OF T&D EQUIPMENT

ID: 10102
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment
Keywords: GIS – 420 kV – SF6-free – Alternative gases - C4F7N – Fluoronitrile – Life cycle assessment

SF6-free Solutions for 420 kV Networks using gas-Insulated Substation (GIS)

Matt BARNETT[1], Arnaud FICHEUX[2], Samuel SOUCHAL[2], Bertrand PORTAL[2], Quentin ROGNARD[2]
[1]SSEN Transmission United Kingdom; [2]GE Grid Solutuions France

ID: 10103
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment
Keywords: Heptafluoro-iso-butyronitrile (C3F7CN / C4F7N / (CF3)2-CF-CN), Sulfur Hexafluoride (SF6), Gas Insulated Lines and Busbars, Electrical Breakdown, Type Test.

Application of SF6 Alternatives for retro-filling existing Equipment

Lujia CHEN[1], L LOIZOU[1], Q LIU[1], M WALDRON[2], G WILSON[2], J OWENS[3]
[1]University of Manchester United Kingdom; [2]National Grid United Kingdom; [3]3M Company United States

ID: 10126
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment
Keywords: temperature rise, continuous current, gas-insulated switchgear, live-tank, dead tank

Comparative Continuous and Overload Current Performance of High Voltage Switchgear with SF6 and Alternative Gases

Victor HERMOSILLO[1], Diana LEGUIZAMON-CABRA[2], Marius CATALA[2], Ludovic DARLES[2], Cyril GREGOIRE[2], Jean-Alain RODRIGUEZ[2]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment

Substation Equipment Overstress Management CIGRE Technical Brochure 816 Compilation

A CARVALHO[1], J AMON[2], M LACORTE[3], C LINDNER[4], R KARRER[5]
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ID: 10136
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment
Keywords: C4F7N, C4-FN, SF6-free, Fluoronitrile, Fluoroketon

Design Considerations for Implementing SF6 Alternatives for Distribution Switchgear Applications with Focus on Toxicity and Load Break Performance

Andres LASO[1], Mattewos TEFFERI[1], Sebastian GLOMB[2], Martin GOPPEL[2], Nenad UZELAC[1], Rene SMEETS[3]
[1]G&W Electric, United States of America; [2]DILO Armaturen und Anlagen GmbH, Germany; [3]KEMA Labs, Netherlands

ID: 10209
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment
Keywords: Manitoba-Minnesota Transmission Project (MMTP), EHV dry type current transformer, dry insulation technology

A New 500 kV AC Overhead Transmission Line Delivering Clean Hydroelectric Power from Canada to The State of Minnesota USA Utilizing 500 kV Dry Type EHV Current Transformers

Robert MIDDLETON[1], Eric EUVRARD[1], James NICHOLSON[2]
[1]RHM International, United States of America; [2]Manitoba Hydro, Canada

ID: 10317
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment
Keywords: SF6-Free, GCB(Gas Circuit Breaker), CFD(Computational Fluid Dynamics), SLF90, post arc-current

Experimental and Numerical Analysis of the Interruption Capability of SF6-Free 245kV 63kA GCB

Jungho PARK, Manjun HA, Kyongbo SEO, Hongkyu KIM, Joohyun LEE
HYOSUNG Corporation, Korea, Republic of (South Korea)

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment

Improving Human Safety & Environment by Innovative Circuit Breaker Testing

Balasaheb DOIPHODE
Scope T&M Pvt. Ltd.

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Topics: PS2 - Decarbonisation of T&D Equipment

Health Indexing and Reliability Assessment of EHV SF6 Circuit Breaker

Sourav ADHYA
Adani Transmission Ltd.

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Topics: PS2 - Decarbonisation of T&D Equipment

SF6-alternative 145 kV live-tank circuit breaker

Peter STENGÅRD[1], Partick STOLLER[1], Saskia BUFFONI-SCHEEL[1], Branimir RADISAVLJEVIC[1], Amaya LAGO[1], Mirko PALAZZO[2], Navid MAHDIZADEH[3]
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ID: 10643
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment
Keywords: SF6 Alternative, Seven Requirements, Health and Safety (EHS), Natural-Origin Gases, CO2/O2 Mixtures, Synthetic Air, N2/O2, Vacuum Circuit Breaker (VCB)

Recent Development of SF6 alternative Switchgear using Natural-Origin Gases in Japan

Toshiyuki UCHII[1], Daisuke YOSHIDA[2], Shigeyuki TSUKAO[3], Koichi TAKETA[4], Kiyohiro TSUBOI[5]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment

Moving towards carbon neutral high voltage Switchgear by combining eco efficient Technologies

Michael GATZSCHE, Vincent TILLIETTE, Ueli STRAUMANN, Henrik LOHRBERG, Freddy VON ARX, Adrian SKEA, Manuel NAEF, Kalpesh CHAUHAN, Navid MAHDIZADEH
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment
Keywords: SF6 alternatives, MV/HV application

Hivoduct - a novel, compact, pressurized air insulated GIL for 72 kV - 420 kV: Design, Simulation and Test results

Walter HOLAUS, Michael SCHUELLER, Matthias SCHNEIDER
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ID: 10658
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment
Keywords: SF6 alternative, circuit breaker, 145 kV

SF6 alternative Circuit Breaker for 145 kV Gas insulated Switchgear

Patrick STOLLER, Thomas HD. BRAUN, Jakub KORBEL, Markus RICHTER
Hitachi Energy Switzerland, Germany

ID: 10799
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment
Keywords: SF6-Free, Fluoronitile, Reliability, Gas handling, Monitoring

Reliability and Operation Test of SF6-free 170kV 50kA GIS with Fluoronitile (C4F7N) Mixtures

J.U. YEUN, H.S. AHN, J. CHOI, Y.G. KIM
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ID: 10848
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment
Keywords: GIS, C4-FN, Fluoronitrile, Switchgear, Circuit-breaker

Switchgear scalability demonstration using environment friendly Fluoronitrile gas mixture in 420 kV GIS substations

Cyril GREGOIRE, Q ROGNARD, Thomas BERTELOOT, Diana LEGUIZAMON, Joel OZIL, Samuel SOUCHAL, F BERNARD, Yannick KIEFFEL
GE

ID: 10875
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment
Keywords: Generator Circuit Breakers, GCB, architectures, environmental impact

Integrated disconnector on Generator Circuit Breakers for environmental and footprint optimization

Jean-Marc WILLIÈME, Denis FRIGIÈRE, Didier RODRIGUEZ, Matthieu BARRE, Blandine REVAUD, Diana LEGUIZAMON
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Topics: PS2 - Decarbonisation of T&D Equipment

Sensitivity Analysis of Capacitive Voltage Transformers for Frequency Response Modelling

Urko ZATIKA LARRINAGA[1], Ixone URRUELA AMIROLA[1], Juan CHACON[1], Alvaro ZARANDONA ARRUEA[2], Manuel DE LA HOZ[2]
[1]ARTECHE GROUP; [2]UPV/EHU

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment

Transmitted Overvoltage Requirements for Instrument Transformers

Tin PERKOVIĆ
HRO CIGRE, Croatia

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment
Keywords: HVCB, C4FN, IEC 62271-100, MOO/CFD, machine learning

Experience in the development of a 170 kV / 50 kA / 60 Hz HVCB using a C4FN+CO2 mixture

Xiangyang YE, Zeljko TANASIC, Hyung Choon KIM, Javier MANTILLA
Hyundai Electric Switzerland Ltd.

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment
Keywords: Bushing, clean air, high voltage, instrument transformer, natural and syntetic ester

Instrument Transformers and bushings using alternative and eco-friendly high voltage insulation systems

Lorenzo GIOVANELLI[1], Udo PRUCKER[2], Esseddik FERDJALLAH KHERKHACHI[3]
[1]TRENCH Italia Srl; [2]TRENCH Germany Gmbh; [3]TRENCH France SAS

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment

Investigation of the Switching Behaviour, Voltage Distribution and Post-Arc Current of series-connected Vacuum Interrupter Units for Live Tank and Dead Tank Circuit Breakers ≥ 420 kV

Tobias GOEBELS[1], Paul Gregor NIKOLIC[2]
[1]Siemens Energy, Germany; [2]Siemens Energy, Germany

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Topics: PS2 - Decarbonisation of T&D Equipment

Experience with F-gas-free High voltage products for On- and Offshore applications

Peter GRONBACH[1], Ann-Sofie MORTENSEN[2]
[1]Siemens Energy, Germany; [2]Siemens Energy, Germany

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS2 - Decarbonisation of T&D Equipment

Research of UHV Gas-insulated Transmission Line (GIL) with Perfluoronitrile (C4F7N) Gas

Keli GAO, Xianglian YAN, Zhibing LI, Wen WANG, Jie HE
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Topics: PS2 - Decarbonisation of T&D Equipment

UAV usage for Asset Condition Assessment

Marcel ELLENBOGEN
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PS 3 DIGITALISATION OF T&D EQUIPMENT

ID: 10104
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment
Keywords: Photonic Voltage Transducer, Photonic Current Transducer, Power Network Monitoring, Smart Grid, Low-power instrument transformer, IEC 61869, IEC 61850-9-2, sampled values

Photonic combined Current and Voltage Transformer demonstration for the Nepalese Grid

G FUSIEK[1], P NIEWCZAS[1], T HEID[2], N GORDON[3], L CLAYBURN[3], S BLAIR[3], G MCFARLANE[4], P MUNRO[4], R MAHARJAN[5], B B SHAKYA[5]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment
Keywords: High Voltage, Substation Equipment, Unmanned Aerial Vehicle, Partial Discharge, Radio Frequency, Diagnostic.

Rapid AIS PD Surveys using a UAV

Phil MOORE[1], David TEMPLETON[1], Ian KERR[2], Mark SIMMONS[2], Damon STEWART[2]
[1]Elimpus Ltd, United Kingdom; [2]National Grid United Kingdom

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment

Application of Machine Learning and Anomaly Detection for On-line Defect Identification in Wall Bushings in HVDC Systems

M ALVES[1], M PINTO[1], G GOMES[1], D ARAUJO[1], F PAIVA[1], B SARDINHA[1], F CARLOMAGNO[1], F FRONTIN[1], L LOPES[1], M COSTA[1], D SANTOS[1], R FLAUZINO[2], M ALVES[3], P FERREIRA[3], G LACERDA[3], D NASCIMENTO[3]
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Topics: PS3 - Digitalisation of T&D Equipment

Real-time Leakage Current Measurement System Applied to LT 230 kV Insulators

D USSUNA[1], R CARVALHO[1], V FILHO[1], E FRESHI[1], W FARIAS[1], G SILVA[1], M TONETTI[2]
[1]Instituto de Tecnologia para o Desenvolvimento - LACTEC; [2]Companhia Paranaense de Energia Elétrica - COPEL

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Topics: PS3 - Digitalisation of T&D Equipment

Application of digital twin technology in the field of substation equipment operation and maintenance

Shuai ZHANG, Song WANG, Linjie ZHAO, Ruihai LI
China South Power Grid International Co., Ltd., China

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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment

Study and Equipment Development of Transient Characteristics Test on Electronic Current Transformer

Yuanyuan HU[1,2], Jie ZHANG[1,2], Lin CHENG[3], Yue TONG[4], Xiang LIU[4], Jun YAO[1,2]
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ID: 10347
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment
Keywords: LPIT(Low Power Instrument Transformer), 145kV, GIS(Gas Insulated Switchgear), MU(Merging Unit)

LPIT Technology Development for 3-phase 145 kV GIS

Dojin KIM[1], Jongwang KIM[1], Hyunmo AHN[1], Dongjun SIM[1], Cheonho LEE[2], Youngmin KIM[2], Jungbae KIM[2]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment

Automated Rack In & Rack out of 22kV/33kV AIS Breakers

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ID: 10566
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment
Keywords: re-ignitions, Transient recovery voltage, life cycle enhancement, Asset health monitoring, IEC62271-306

Application of controlled switching for a 500kV switchable line reactor connected to 600 MW solar power generating plant to reduce probability of unintentional re-ignitions and life cycle enhancement – A field case study

Tuan HOANGNGOC[1], Urmil PARIKH[2], Naveen DUBEY[2], Mirko PALAZZO[3], Hong Xuan NGUYEN[4]
[1]ABB Power Grids Vietnam; [2]ABB Power Products and Systems India Limited; [3]Hitachi ABB Power Grids Switzerland; [4]TOJI Group

ID: 10644
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment
Keywords: digitization of GIS, monitoring and diagnosis, AI technology

Recent Digitization of GIS and Sophistication of Equipment Condition Monitoring and Diagnosis applying AI Technologies

Eiji MATSUMOTO[1], Kazunori UCHIDA[1], Minoru SAITO[1], Akihiro YAMAGUCHI[2], Toshihiro MAEKAWA[3], Kiyotaka BABA[3]
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ID: 10645
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment
Keywords: Switchgear, Circuit - Breaker, Disconnector, IoT, Sensor, CBM, Current - Waveform, Sound

Development of Switchgear Condition Monitoring using IoT Technology for Condition Based Maintenance

Shinya AICHI, Yasunori ITO, Hiroshi YAMADA, Kaio WAKAIKI, Toshifumi SUGIMOTO
Chubu Electric Power Grid Co., Inc.

ID: 10659
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment
Keywords: SF6, LPIT, GIS

Optimized LPIT (Low Power Instrument Transformers) applications in GIS based on SF6 and climate friendly insulating Gas g3

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ID: 10660
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment
Keywords: digital monitoring, switching transients, drive technologies, asset management, CBs

Field application of controlled switching &advanced digital monitoring techniques to mitigate switching transients and asset management for various power equipment connected with CBs with different drive technologies

Michael STANEK[1], Urmil PARIKH[2], Mirko PALAZZO[1], Davide ZANON[3], Sebastiano SCARPACI[3], Patrik LINDFORS-DAHLIN[4]
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment

Advanced High Voltage Disconnector Condition Monitoring

Juan Carlos PÉREZ QUESADA[1], Jonathan REGUERA[1], Iban LANDETA[1], Sergio QUINTIN CLEMENTE[2], Jose Enrique ALONSO ALFAYATE[2]
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ID: 10876
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment
Keywords: Controlled switching, bandwidth, accuracy, conventional, voltage

Benefit of high-resolution/high bandwidth acquisition of conventional voltage and current transformers for controlled switching: illustration with latest generation of controller

Alain FANGET, Farid AIT-ABDELMALEK, Jean SOUBIES-CAMY
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A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment
Keywords: Mixed reality, augmented reality, virtual reality headset, field commissioning, site acceptance tests

Commissioning of HV primary equipment in pandemic times

Jean SOUBIES-CAMY, J FERNANDES, F DESPONTIN, Jean-Luc RAYON
GE France

ID: 11137
A3 TRANSMISSION AND DISTRIBUTION EQUIPMENT - Full Papers
Topics: PS3 - Digitalisation of T&D Equipment
Keywords: Condition – Monitor, Data – Management, Training, IEC 61580, Failure – Prevention

Monitor Data Management for Asset Failure Prevention

Abigail ZAFRIS, Reynold CORNELL
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B1 - INSULATED CABLES

PS 1 LEARNING FROM EXPERIENCES

ID: 10106
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences
Keywords: XLPE cable - Cable tunnel - Fire performance - Fault simulation - London Power Tunnels

Fire Risk from XLPE Cables in Air

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ID: 10276
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences
Keywords: reliability, fault tree analysis, insulated cable, trifurcating joint

Application of Fault Tree Analysis to Underground Cable Accessories

Andrew R. MORRIS, Najwa ABOUHASSAN
Commonwealth Edison Company, United States of America

ID: 10292
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Development of Economic and Environment-friendly 66kV Array Cable

Xiejun XU[1], Kai CHEN[1], Wenlin PAN[1], Qingsheng CHANG[2], Yanli XU[2], Xinhao GONG[2]
[1]Hengtong Submarine Power Cable Co., Ltd., China; [2]Hengtong Optic-Electric Co., Ltd., China

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B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Technology of Large Length 500kV XLPE Insulated AC Submarine Cable

Y. ZHAO, M. HU, W. WANG, S. XIE, H. ZHANG
Zhongtian Technology Submarine Cable Co., ltd., China

ID: 10443
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Analysis of Failed Cable Termination: Role of Workmanship and Electrical Stresses

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ID: 10510
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Simulations of losses in armoured 3-core submarine cables using 3D FEM compared to measurements

Ola THYRVIN[1], Danijela PALMGREN[1], Dag WILLEN[2]
[1]NKT HV Cables AB, Sweden; [2]NKT Group A/S, Denmark

ID: 10511
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Lightning strike to ground – a case study about observed cable damages, risk estimation and protection method

Valentinas DUBICKAS[1], Erik THUNBERG[1], Johan HANSSON[1], Andreas DERNFALK[2], Peter SIDENVALL[2]
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ID: 10512
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Lightning strikes to ground affecting underground power cables

Thomas WORZYK, Ola THYRVIN
NKT HV Cables AB, Sweden

ID: 10538
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Failure cause analysis and prevention of subsea cable failures in a joint industry project (JIP CALM)

M. KAVIAN[1], D. SAHA[1], S. ANJUN[1], F.H DE WILD[1], P.C.J. VAN DER WIELEN[1], N. BRUINSMA[2], A.P. LUIJENDIJK[2], A. MORENO-RODENAS[2], N.G. JACOBSEN[2], T.J. ROETERT[2], E. KRAS[2], F.J. SAVENIJE[3], E. WIGGELINKHUIZEN[3], J. JAYAKUMAR[3], M.J. VAN DER HOEK[4], H. DE BRUIN[5]
[1]DNV Asset Management, The Netherlands; [2]Deltares Harbour Coastal and Offshore, Hydraulic Engineering, The Netherlands; [3]TNO Unit Energy Transition, Research group Wind Energy, The Netherlands; [4]VanderHoekPhotonics, The Netherlands; [5]BREM funderingsexpertise, The Netherlands

ID: 10544
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Practical experience and modelling of the corrosion behaviour of the Aluminium metallic cable sheath

Roy ZUIJDERDUIN[1], Ranjan BHUYAN[1], Jacco SMIT[1], Matteo CARUSO[2], Johathan MOENS[2], Ralf BOSCH[2], Jos VAN ROSSUM[3]
[1]TenneT TSO; [2]Laborelec; [3]Prysmian

ID: 10663
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences
Keywords: dry type outdoor cable termination, field experience

Evolution of dry type outdoor cable terminations based on field experience

Tarek FAHMY[1], Filippo BIONDA[1], Marcel HECKEL[2]
[1]PFISTERER Switzerland AG; [2]PFISTERER Kontaktsysteme GmbH

ID: 10665
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences
Keywords: temperature monitoring, current rating, computation

Temperature monitoring and current rating computation for the Cluster Westlich Aldergrund

Etienne ROCHAT, A. GOY, R. GUERICKE
Omnisens Switzerland, 50Hertz Transmission Germany

ID: 10667
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences
Keywords: cable temperature monitoring, offshore wind farm

Complex cable temperature monitoring within the largest commissioned offshore wind farm

Etienne ROCHAT[1], Alexandre GOY[1], Fabien RAVET[1], Lukas Milan DOMURATH[2], Maria-Eftychia VESTARCHI[2], Hossein GORBANI[2]
[1]Omnisens Switzerland; [2]Oersted Denmark

ID: 10668
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Validation of an Efficient 3D Finite Element Model for the Calculation of Losses in Three-Core Armoured Power Cables

Andreas CHRYSOCHOS[1], Dimitrios CHATZIPETROS[1], Ioannis ZTOUPIS[1], James PILGRIM[2], Vasileios KANAS[1], Konstantinos PAVLOU[1], Kostas TASTAVRIDIS[1], George GEORGALLIS[1]
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ID: 10689
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences
Keywords: Amonton, Coulomb Friction Law, Analysis System, Cable Creepage, Power Cable

Development of Analytical Method for Power Cable Creepage Phenomenon in Duct

Tomonori KAMIBAYASHI[1], Tadanori NAGAYAMA[1], Katsumi IWAMURA[2], Koki KASHIRO[2], Hiroyasu NISHIKUBO[3]
[1]Tohoku Electric Power Network Co., Inc.; [2]Furukawa Electric Co., Ltd.; [3]FITEC Corp.

ID: 10690
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences
Keywords: SCOF, Degradation, Diagnosis, Gas Analysis, ICP, PD, TJ, PLC

Iof Cause of Breakdown and Replacement of 275 kV SCOF Cable by XLPE Cable in Japan

Yusuke IKEDA[1], Tomoteru KYOUGOKU[2], Kozo SUZUKI[3], Tai YOKOYAMA[3], Takayuki MINAMI[3]
[1]TEPCO Power Grid, Inc.; [2]TEPCO Holdings, Inc.; [3]Sumitomo Electric Industries, Ltd.

ID: 10693
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Sequence Impedance of Submarine Cables

T KVARTS, Z HUANG, A C GAROLERA, O THYRVIN
CIGRE Denmark, Denmark

ID: 10702
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Determination of Soil Thermal Resistance: A Holistic Approach

Andreas CHRYSOCHOS, Dimitrios CHATZIPETROS, Varvara RIZOU, Konstantinos PAVLOU, Kostas TASTAVRIDIS, George GEORGALLIS
Hellenic Cables, Greece

ID: 10703
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Effect of Semi-Conducting Jackets on the Performance of Three-Core Armoured Power Cables

Andreas CHRYSOCHOS, Dimitrios CHATZIPETROS, Dimitrios KOSSYVAKIS, Vasileios KANAS, Konstantinos PAVLOU, Kostas TASTAVRIDIS, George GEORGALLIS
Hellenic Cables, Greece

ID: 10714
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences
Keywords: HDD;filling materials;thermal modelling

Belgian experience with horizontal directional drilling (HDD) filling materials and thermal modelling of HDD

Tanguy SNAPS, F. EL BARNOUSSI, W. VAN DER AUWERA, Simon STUL
ENGIE

ID: 10744
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences
Keywords: Submarine power cables

Effective of Strategic Planning in the Restoration of a Submarine Cable Fault

Ibrahim ALNASSER[1], Yasir AHMED[1], Paul O'ROURKE[2]
[1]Saudi Aramco, Saudi Arabia; [2]Construction Director, Greenlink Interconnector Limited, Ireland

ID: 10774
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

PD, temperature and acoustic measurement of Eleclink HVDC interconnector – anticipate failures to minimize service disruption and impact on train circulation

Alessandro PISTONESI
PRYSMIAN POWERLINK Italy

ID: 10867
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Best practices for Partial Discharge Monitoring of HVDC Cable Systems and Qualification Tests

Fernando GARNACHO[1,2], Abderrahim KHAMLICHI[1,2], Fernando ÁLVAREZ[2], Ángel RAMIREZ[1], Carlos VERA[2], Jorge ROVIRA[1], Pascual SIMÓN[1], Álvaro CAMUÑAS[2], Eduardo ARCONES[2], Javier ORTEGO[2,3]
[1]FFII-LCOE; [2]UPM; [3]AMPACIMON

ID: 10868
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

REE´s commitment to partial discharge monitoring in its underground cable network

Ricardo GÓMEZ, Ricardo REINOSO, Gonzalo DONOSO, Elena NOGUEROLES
REE

ID: 10869
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Lessons learned in the maintenance of REE´s submarine lines

Daniel BLANCO, Álvaro FRANCÉS, Gonzalo DONOSO, Elena NOGUEROLES
REE

ID: 10878
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences
Keywords: underground cable, pulling forces, calculation tool, installation, ducts

Increasing underground cable pulling length – a way to improve cost efficiency and reliability of projects

Candice HILAIRE, Renaud ROSSETTI
RTE France

ID: 10881
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences
Keywords: KEYWORDS 225 kV SCFF cables, decommissioning, risk mitigation, high voltage cables recycling

Decommissioning of a self-contained fluid-filled cable: operating method and risks mitigation

Imane KAMAL[1], M LEFEVRE[2]
[1]EDF; [2]CTE+

ID: 10955
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Time to failure testing of model HV XLPE Cables in salt Water at high electrical AC Stress and Temperature

Sverre HVIDSTEN[1], Karl Magnus BENGTSSON[2], Espen OLSEN[2]
[1]SINTEF Energy Research; [2]Nexans Norway

ID: 10957
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Formation of Potentially Harmful Shrinkage Cavities During Operation of MassImpregnated Non-Draining HVDC Cables

Magne RUNDE[1], Ø. HESTAD[1], Carl Erik HILLESTAD[2], B KLEBO-ESPE[2], H. TOLLEFSEN[3], L. LERVIK[3], V. DUBICKAS[4], E. THUNBERG[4], J. RANTANEN[5], T. RAUHALA[5]
[1]SINTEF Energy Research; [2]Statnett; [3]Nexans Norway; [4]Svenska Kraftnät; [5]Fingrid

ID: 10958
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

HVDC Cable Installation in Freshwater Lake (Suldalsvatnet)

Anders RØREN[2], Ø. PETTERSEN[2], L. SOLBERG[1]
[1]Nexans Norway AS; [2]Statnett

ID: 10960
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences
Keywords: Instrumentation on HV Cable Systems for condition-based Maintenance

Instrumentation on HV Cable Systems for condition-based Maintenance

Tony LUCIGNANO, J. MATALLANA
Statnett

ID: 10999
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences
Keywords: submarine cable, external hazards, protection

Future long-distance AC XLPE submarine cable from Khanom to Samui Island. Guidelines to protect the cable against external hazards

Puriwat SUTTITHAM
TNC-CIGRE, Thailand

ID: 11073
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Advanced Analysis of Partial Discharges on Power Cables

Erik WINKELMANN
HIGHVOLT Prueftechnik Dresden GmbH

ID: 11164
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Experiences and Insights Rehabilitating a 69kV SCFF Cable System after Pressure Loss

Jake GELHARD
EHV Power Inc.,Canada

ID: 11165
B1 INSULATED CABLES - Full Papers
Topics: PS1 - Learning from Experiences

Developments towards a Risk Based Maintenance program to reduce fires at LV cable terminations and plastic enclosures

Andre Nico CUPPEN[2], Bernard GREENWOOD[1], William HEFFERNAN[3], David BREDDA[1]
[1]Unison Networks Ltd.,; [2]Powerco Ltd.,; [3]EPECentre - New Zealand

ID: 10142
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications
Keywords: Oil-filled cable systems, terminations, joints, pipe-type cable systems, transmission asset management strategies

Emerging Asset Management Strategies for OF Cable Technologies in North America

Ivan JOVANOVIC
KUVAG Group, United States of America

ID: 10297
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications

Operational Simulation on ±100 kV/1 kA DC Superconducting Energy Pipeline for Energy Interconnection

Zhiyong YAN, Jiahui ZHU, Ming QIU
China Electric Power Research Institute, China

ID: 10359
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications

Development, Adjustment and Implementation of the HTS Transmission Cable Line (2.4 Km) in St. Petersburg

V.E. SYTNIKOV, A.V. KASHCHEEV, M.V. DUBININ, A. MATINYAN
"R&D Center @ FGC UES", JSC

ID: 10513
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications

Prequalification test of a 525-kV extruded DC cable system under special conditions: challenges and implications on cable system performance

Amirhossein ABBASI, T QUIST, A PETERSSON, Thomas WORZYK, Kristian GUSTAFSSON, Sridhar ALAPATI
NKT HV Cables AB, Sweden

ID: 10514
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications

Transient Over Voltage Testing of Cable Systems in MMC-HVDC Links: A Concept Study Including Verification

Sridhar ALAPATI[1], Kenneth JOHANSSON[1], Mats SJÖBERG[1], Magnus KLANG[1], Amirhossein ABBASI[1], Markus SALTZER[2]
[1]NKT HV Cables AB, Sweden; [2]NKT GmbH & Co. KG, Germany

ID: 10642
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications

Development and site application of intelligent partial discharge and condition assessment system for underground transmission lines

Y.H. JUNG
KEPCO

ID: 10691
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications
Keywords: Underground Transmission Lines, Quality Management System, Dielectric Breakdown, Transmission System Operator

A Study of Quality Management System for Underground Transmission Lines by Japanese Transmission System Operators

Takato WATANABE[1], Yutaka TSUJI[2], Masataka OGURA[3]
[1]Chubu Electric Power Grid Co., Inc.; [2]TEPCO Power Grid, Inc.; [3]Kansai Transmission and Distribution, Inc.

ID: 10879
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications
Keywords: Underground cables, monitoring, Cathodic Protection, LoraWan network, voltage and current sensors

Maintenance and asset digitalisation with cable monitoring systems supervision

Mathieu GROULT, Laura CORDEBART, Matthieu CABAU
RTE France

ID: 10880
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications
Keywords: HVDC cable system, ageing, leakage current, tangent delta, measurement.

Evaluation of the HVDC VSC cable system behaviour in presence of transient voltage phenomena

Nicolas GUERRINI[1], Damien BACHELLERIE[1], A FUSTIER[1], F PADILLO[1], Lluis-R SALES CASALS[1], Pierre HONDAA[3], PAscale PRIEUR[3], G DENCHE CASTEJON[2], J.M. ARGUELLES ENJUANES[2]
[1]PRYSMIAN; [2]REE; [3]RTE France

ID: 10882
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications
Keywords: submarine export cable, dynamic rating, overplanting, imbalance, offshore wind farm

Optimal energy management of offshore wind farms considering the combination of overplanting and dynamic rating – Results of the CELT4Wind project

Anne BLAVETTE[1], H. BEN AHMED[1], I DAMINOV[2], S BOURGUET[2], D TRICHET[2], G WASSELYNCK[2], L DUPONT[3], T SOULARD[4], P WARLOP[5]
[1]ENS RENNES-CNRS; [2]Université de NANTES; [3]Université Gustave Eiffel; [4]Ecole Centrale de NANTES; [5]WPD

ID: 10939
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications
Keywords: Partial discharge, Cable, Termination, Acoustic measurement, RFI measurement

Identification of Partial Discharges in Cable Terminations using Methods based on acoustic, electromagnetic and electrical Measurements

Juhani TAMMI[1], Tuukka SYRJÄNEN[1], Robert ALBRECHT[2], Kim BACKMAN[3], Kari LAHTI[4], Pertti PAKONEN[4]
[1]Fingrid Oyj; [2]NL Acoustics; [3]Prysmian Group Finland; [4]Tampere University

ID: 10961
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications
Keywords: Single Point Bonding of 3-core Submarine Cables

Single Point Bonding of 3-core Submarine Cables

Espen OLSEN, M. HOVDE
Nexans Norway AS

ID: 11028
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications
Keywords: Performance and characterization tests on HPTE insulation material

Performance and characterization tests on HPTE insulation material

Grazia BERARDI
Prysmian Group Italy

ID: 11070
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications

Combined Type Test of HVDC Cable System with Integrated DC GIS Components for U0 = ±525 kV

Dominik HAERING[1], Shoji MASHIO[2]
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ID: 11072
B1 INSULATED CABLES - Full Papers
Topics: PS2 - Future Functionalities and Applications

Influence of Cabling on Harmonic Voltages in a Transmission Grid using an Exemplary Test Grid

Andrea Kerstin SCHAEFER[1], Simon MASSAT[2], Jutta HANSON[3], Gerd BALZER[4]
[1]Technische Universität Darmstadt, Germany; [2]Technische Universität Darmstadt, Germany; [3]Technische Universität Darmstadt, Germany; [4]Technische Universität Darmstadt, Germany

PS 3 TOWARDS SUSTAINABILITY

ID: 10692
B1 INSULATED CABLES - Full Papers
Topics: PS3 - Towards Sustainability
Keywords: Conduit, Duct, Pre Laying, Urbanization, Environmental Impact

Replacement by utilizing existing Facilities for EHV Underground Transmission Lines

Tadahiko SHIRO, Ryosuke ISHII, Masataka OGURA
Kansai Transmission and Distribution, Inc.

ID: 10717
B1 INSULATED CABLES - Full Papers
Topics: PS3 - Towards Sustainability
Keywords: Sustainability;power cable

Towards Sustainability: A Power Cable Industry Supplier's Perspective

Marc BAILLEUL, Annika SMEDBERG, Elisabeth RIBARITS, Davide VIELMI
BOREALISGROUP

ID: 10962
B1 INSULATED CABLES - Full Papers
Topics: PS3 - Towards Sustainability

Availability modelling of submarine high voltage Cable Systems

Abbas LOTFI, M. TANDBERG, Ø. BERGENE
Nexans Norway AS

B2 - OVERHEAD LINES

PS 1 CHALLENGES & NEW SOLUTIONS IN DESIGN AND CONSTRUCTION OF NEW OHL

ID: 10155
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL
Keywords: distribution line, transmission line, National Electric Safety Code, railroad line crossing, right-of-way

Resilience and Reality: Unique Challenges and Learnings from Circuit Resiliency Project Planning and Execution

Justin KLEEHAMMER
Commonwealth Edison, United States of America

ID: 10300
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Analysis of The Ice-shedding of Wire Based on Elastic Deformation Principle

Haiyun NI, Rongjian LIU, Erlei TANG, Kunchi YANG
Yunnan Power Grid CO., LTD, China

ID: 10362
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Plastically Compacted Steel - aluminium Wires for New Overhead Lines

V. KURYANOV[1], L. GYREVICH[2], L. TIMASHOVA[3], V. FOKIN[4]
[1]NRU "Moscow Power Engineering Institute"; [2]Volgograd State Technical University; [3]JSC "R&D Center "FGC UES"; [4]LLC "Energoservis"

ID: 10364
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Selection System of High-voltage External Insulation for A.C. and D.C. Electric Transmission on the Basis Pollution Mapping

L.L. VLADIMIRSKII, O.V. SUSLOVA
JSC «NIIPT»

ID: 10445
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Selection of Porcelain Insulator Components for Transmission Lines in High Altitude and Exposure to Ice and Snow

Sakthivelu SUBRAMANIAN
Grasim Industries Ltd (Unit: Aditya Birla Insulators)

ID: 10446
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Design and Testing of UHV 765/400 KV Transmission Line Monopole Structures Powergrid's Experience

Karan Vir Singh PUNDIR
Power Grid Corporation of India Ltd.

ID: 10447
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Improvement of Bearing Capacity of Soil using Bamboo Nailing and Sand Piling for 400kV Transmission Line Tower Foundations in Tripura, India

L K KHAJKUMAR
Power Grid Corporation of India Ltd.

ID: 10449
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Design Innovations for Mitigating Construction Challenges of Overhead Lines

Subhash C TANEJA
Power Grid Corporation of India Ltd.

ID: 10539
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Full Scale Test of the 400 kV double circuit pylons (Wintrack type III)

J. SPITHOVEN[1], J. VERDUIJN[1], M.R. SHAH MOHAMMADI[2], T.J. PLOEG[2], E. PLATENKAMP[2]
[1]TenneT TSO; [2]DNV Energy Systems

ID: 10629
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL
Keywords: Overhead Transmission Lines, Wind Resistant Design, Equivalent Static Wind Load, Basic Wind Speed Map, Snow Resistant Design, Wet-Snow Accretion, Snow Load Map, Seismic Resistant Design, Layer Shear Force Coefficient Method

Latest design Standard on Structures for Transmissions in Japan

Yoshikazu KITANO[1], Soichiro SUGIMOTO[1], Yusuke SATO[1], Shinya HATAKEYAMA[2], Tomoaki OSONO[3], Hiroshi SHIGEMOTO[4]
[1]CRIEPI; [2]Tohoku Electric Power Network Co., Inc.; [3]TEPCO Power Grid, Inc.; [4]Kansai Transmission and Distribution, Inc.

ID: 10669
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL
Keywords: test methods, composite insulator, reliability, OHL

Applications of multi-stress Test Methods to evaluate today's Composite Insulator Reliability

Jaka STRUMBELJ[1], Christiane BAER[1], Jan LACHMAN[2], Frank SCHMUCK[3]
[1]PFISTERER Switzerland AG; [2]EGU - HV Laboratory a.s. Czech Republic; [3]Schmuck HV Insulation Consulting GmbH Switzerland

ID: 10757
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

RTV Coated Insulators in Harsh Desert Environment

Raouf ZNAIDI, Faisal HUDA, Javier GARCIA, Ahmad ALTHAGAFI
GCCIA, KSA

ID: 10797
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL
Keywords: Hybrid Transmission Line, HVDC Electric Field, Ion flow

Electrical environment evaluation of HVAC/HVDC hybrid transmission line using a reduced scale-model

Koo Yong SHIN[1], J.A OH[1], S.W LEE[1], T.W KIM[1], J.M WOO[2], M.N JU[2]
[1]KEPCO, Korea, Republic of (South Korea); [2]KERI, Korea, Republic of (South Korea)

ID: 10852
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Electromagnetic interference investigation of two overhead lines with a natural buried gas pipeline: An investigation on the Agri-Horasan Region in Turkey

Özgür ÇETİN[1], Hıdır DÜZKAYA[2], Cengiz TAPLAMACIOĞLU[3]
[1]Turkish Electricity Transmission Corporation Ankara, Turkey; [2]Gazi University Department of Electrical and Electronic Engineering Ankara, Turkey; [3]Gazi University Department of Electrical and Electronic Engineering Ankara, Turkey

ID: 10853
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Site Application of Anti Torsion Pendulum and Interphase Space for the Prevention of Ice Load on Transmission Line Systems in Turkey

Mete UZAR[1], Wolfgang TROPPAUER[2], Dilek GURSU[3], Aytaç SAĞIR[4]
[1]TEIAS, Turkey; [2]Mosdorfer GmbH, Austria; [3]T Design, Turkey; [4]TEIAS, Turkey

ID: 10914
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Affordable towers compaction using aerospace-borrowed lattices

José Ramón LÓPEZ-BLANCO[1], Pablo RODRÍGUEZ-HERRERÍAS[2], Carlos GARCÍA-BARRIOS[2]
[1]Anisopter Insightful Research; [2]Red Eléctrica de España

ID: 10963
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Worlds longest Span with ACSR Conductor – Design challenges

Boris ADUM, Kjell HALSAN
Statnett SF

ID: 10974
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Design of Overhead Lines in a changing Climate

Emilie IVERSEN[1], Bjørn Egil NYGAARD[1], Ø. HODNEBROG[2], M. SAND[2], M. RADOJCIC[3]
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ID: 10975
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Structural reliability analysis of Transmission lLine towers by use of advanced Weather Modelling

Andreas LEM[1], Ø. LANDE[2], S. GRINI[3]
[1]Statnett; [2]DNV; [3]KVT / Norconsult

ID: 10976
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Development of Aluminium Tower for 420 kV AC line to reduce environmental impact and safety risks under construction

Gilles SABATIER-OLNE[1], Andreas LEM[2], Øyvind WELGAARD[2]
[1]Efla AS; [2]Statnett SF

ID: 11024
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Development of lifting device for raising height of existing towers of overhead lines

Łukasz NAZIMEK, Sławomir LABOCHA, Robert CZYZ
ENPROM Sp. z o.o.

ID: 11076
B2 OVERHEAD LINES - Full Papers
Topics: PS1 - Challenges & New Solutions in Design and Construction of New OHL

Design and construction of a high and heavy lattice tower for 380 kV transmission line

Kyriaki GÜNTHER – PAPADOPOULOU[1], Josef GLÖGGLER EQOS[2]
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PS 2 LATEST TECHNIQUES IN ASSET MANAGEMENT, CAPACITY ENHANCEMENT, REFURBISHMENT

ID: 10278
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment
Keywords: pollution, insulators, silicone coating, glass insulators, maintenance

Overhead Line Insulators in Operating Constraints Under Severely Polluted Conditions: the Benefits of Silicone Coated Glass Insulators and their Application at the PG&E Diablo Canyon Nuclear Power Plant

Craig ESPINOSA[1], Do VO[2], Jean-Marie GEORGE[3]
[1]Sediver, United States of America; [2]Pacific Gas and Electric, United States of America; [3]Sediver, France

ID: 10302
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

A Novel Method for Pollution Detection of External Insulation

Guangning WU, Yujun GUO, Xueqin ZHANG, Guizao HUANG, Chengfeng YIN
Southwest Jiaotong University, China

ID: 10303
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

Experimental Study of Dynamic Bending Stiffness of Overhead Conductors with Formed Wires

Zhao ZHANG, Shengchun LIU, Yi QI, Jian ZHANG, Zhen LIU, Long LIU
China Electric Power Research Institute, China

ID: 10363
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

Application of a Fibre Bragg Grating-based Sensing System for Icing Detection and Structural Health Monitoring of Transmission Lines in Russia

A.V. VANYAKIN, A. LIKHOBABIN
«Souztechenergo», JSC

ID: 10515
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

Countermeasures for high and extreme ice loads typical for Norwegian environment based on concept of heatin

Andreas DERNFALK[1], Christian AHLHOLM[1], Johan LUNDENGÅRD[1], Igor GUTMAN[1], Boris ADUM[2]
[1]Independent Insulation Group, Sweden; [2]Statnett, Norway

ID: 10540
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

How to increase Resilience by assessment based on study case 400 kV Overhead Line Stevin – Horta in Belgium

P. SMET[1], B. RISSE[1], T.J. PLOEG[2], E. PLATENKAMP[2]
[1]ELIA Asset SA; [2]DNV Energy Systems

ID: 10577
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

Artificial Intelligence in the Diagnosis of Fault Causes in Transmission Lines

Oswaldo ARENAS
INTERCOLOMBIA

ID: 10580
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

Preparatory analysis to establish a reliable and efficient DLR system

Balint NEMETH, Gabor GOCSEI, Levente RACZ, David SZABO
Budapest University of Technology and Economics, Hungary

ID: 10624
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment
Keywords: Transmission overhead lines monitoring, sag monitoring, strain monitoring, weather station

Corelation between tensile Force in Conductors and Stress loading of tensile Towers

Nenad GUBELJAK[1], Viktor LOVRENCIC[2], Kresimir BAKIC[3], Dusan KOZJEK[4]
[1]University of Maribor, faculty of Mechanical Engineering, Slovenia; [2]C&G d.o.o., Ljubljana, Slovenia; [3]ELES, d.o.o., Ljubljana, Slovenia; [4]ELES, d.o.o., Ljubljana, Slovenia

ID: 10630
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment
Keywords: Transmission line, Transmission steel tower, Inspection, Repairing, AI, Deep learning, Drone, Carbon fiber-reinforced plastic

Deterioration diagnosis-imaging Technology and deterioration countermeasure Technology for overhead transmission line

Kensei YAMAMOTO, Tomoaki OSONO, Hiroyuki MIYOSHI, Tomoaki KAWAMURA, Motoyuki YAMAZAKI, Tomonori SHIRAISHI
TEPCO Power Grid, Inc

ID: 10631
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment
Keywords: HTLS, ACFR, TACFR, CFCC, Composite conductor, Long term reliability evaluation, Fitting

Evaluation of long-term Reliability of the carbon fiber core Wire and Development of Technologies to expand its Application

Hiroaki SASA[1], Tomoyuki AOYAMA[1], Naohiko SUDO[1], Kiyonobu NARA[2], Takao KANEKO[3], Mami NAKAGAWA[4]
[1]Tohoku Electric Power Network Co., Inc.; [2]Kitanihon Electric Cable Co., Ltd.; [3]Fujikura Ltd.; [4]Furukawa Electric Power Systems Co., Ltd.

ID: 10632
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment
Keywords: Melted conductor, Melted strand, Residual tensile strength, Simple repair

Evaluation of residual mechanical performance of damaged conductor strands due to AC fault arcs for rational repair of overhead line

Keisuke SUGITA, Tomoki MIYOSHI, Tomoaki SEI, Satoru YOSHIDA
Chubu Electric Power Grid Co., Inc.

ID: 10633
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment
Keywords: Atmospheric corrosion, Under-film corrosion, Deposition, Sea salt, Paint, Transmission tower, Hot-dip galvanizing, Hot-dip zinc-aluminum alloy galvanizing, Maintenance, Life, Cost

Rationalization of maintenance Methods for hot-dip galvanizing transmission Tower

Teruhisa TATSUOKA[1], Hiromitsu IJICHI[1], Keiichi YOSHINO[1], Tomoaki KAWAMURA[2], Motoyuki YAMAZAKI[2], Tomonori SHIRAISHI[2]
[1]Tokyo Electric Power Company Holdings, Inc.; [2]TEPCO Power Grid, Inc.

ID: 10634
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment
Keywords: Overhead Transmission Line - Galloping - Bundled Conductor - Spacer - Rotative Clamp, Full Scale Test Line, Observation, Numerical Simulation, Wind Tunnel Test

Efficacy of Loose Spacers in Mitigating Galloping of Bundled Conductors

Tomoki KITASHIMA[1], Takeshi FUJIMOTO[1], Hisato MATSUMIYA[2], Takuhiko OHASHI[3], Tomonori SHIRAISHI[4], Fumito MINOURA.[4]
[1]Furukawa Electric Power Systems, Co. Ltd.; [2]Central Research Institute of Electric Power Industry; [3]TEPCO Power Grid, Inc.; [4]Tokyo Electric Power Company Holdings, Inc.

ID: 10670
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment
Keywords: transmission capacity, upgrading HV lines, insulated suspension chain

Upgrading the transmission capacity of existing high voltage lines using insulated suspension chain ISC

Toni WUNDERLIN
AXPO GRID AG Switzerland

ID: 10698
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

A Study on the Life-Time Assessment Ways and Various Failure Types of 154kV Porcelain Insulators Installed in South Korea

Jabin KOO[1], Wonkyo LEE[1], Taeyong KIM[2]
[1]KEPCO; [2]Sungkyunkwan University

ID: 10718
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment
Keywords: inspection techniques;digital tools;overhead lines

Innovative inspection techniques and digital tools for condition follow-up of overhead lines in Belgium

Stephane GERMAIN, Emmeline VRANKEN, P. BUNGA, L. COLLIN, Bernard RISSE
ELIA

ID: 10766
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment
Keywords: NG, Utilization, Silicon grass, RTV, NSDD

Operational Evaluation of RTV Coating Performance over 17 years on the Coastal Area at Jubail-SA

Jaafar ALTHAWAB, Musleh ALAMERI
Saudi Electricity Company- National Grid SA, Saudi Arabia

ID: 10887
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

Metamodel applied to fatigue damage in overhead lines conductors

Julien SAID[1], S EL IDRISSI RAGHINI[2], M GUEGUIN[2], E CIEREN[2], L COHEN[1], F HAFID[1], J.M. GHIDAGLIA[3], M COULANGEON[4], J BROCARD[4]
[1]RTE France; [2]EUROBIOS; [3]Centre Borelli-ENS Paris-Saclay-CNRS-Université Paris-Saclay; [4]DERVAUX, SICAME GROUP

ID: 10911
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

Dynamic line rating in the Spanish overhead transmission network

Antonio USEROS, Alexandra BURGOS, Lucía MATEO, Ricardo REINOSO, José María ABAD, Agustín GUTIERREZ
Red Eléctrica de España

ID: 11074
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

Probabilistic safety concept in overhead line construction

Stefan STEEVENS[1], Niklas WINKELMANN[2]
[1]Amprion GmbH, Germany; [2]Amprion GmbH, Germany

ID: 11141
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

Case Study: Measuring the Size of Electrical Conductors using Lidar Scanning

Brian OBERMEIER
Burns & McDonnell, United States of America

ID: 11142
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

Towards a predictive model for the residual strength of PMC composite core in HTLS conductors in function of the operating conditions

Baptiste GARY[1], José PORTOLES[1], Maeva CHAMBAUD[1], Haithem BEL HAJ FREJ[2], Xavier COLIN[2]
[1]Epsilon Composite France; [2]ENSAM France

ID: 11143
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

An Empirical Analysis of the Operational Efficiencies and Risks Associated with Static, Ambient Adjusted, and Dynamic Line Rating Methodologies

Kristine ENGEL*[1], Jonathan MARMILLO[1], Mahraz AMINI[2], Hamid ELYAS[2], Babak ENAYATI[2]
[1]LineVision Inc., United States; [2]National Grid USA

ID: 11144
B2 OVERHEAD LINES - Full Papers
Topics: PS2 - Latest Techniques in Asset Management, Capacity Enhancement, Refurbishment

Full-Scale Tests for the Purpose of Verifying the Method for Determining the Boom of the Wire Sag by the Period of its own Oscillations

Danil YAROSLAVSKY1*, Marat SADYKOV, Mikhail GORYACHEV
Kazan State Power Engineering University, Russian Federation

PS 3 ENVIRONMENTAL AND SAFETY ASPECTS FROM OHL (JOINT PS WITH C3)

See also C3 PS3

ID: 10135
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)

Development of Methodology for Insulator Replacement in ±800 kV DC Strings Using Live Line Procedures

R GARCIA[1], J CARDOSO[1], F SILVA[1], C MATT[1], P MARCONDES[2], L SENNA[2], D MACHADO[2], F FARIA[2], R COSTA[2], J GRAHAM[2], A NIGRI[3]
[1]CEPEL; [2]SGBH; [3]AINIGRI

ID: 10138
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)

Wildfire Detection System Using Artificial Intelligence with the Collaboration of the Web Society

C NASCIMENTO[1], A LISBOA[2], H YEHIA[3], H MAGALHÃES[3], A NETO[4], A BARBOSA[3], P VENÂNCIO[2], T REZENDE[2], A MAGALHÃES[5], R CAMPOS[6], M MELO[3], G CABELO[3], D LIMA[7], M SOUZA[7]
[1]CEMIG D; [2]Gaia Solutions on Demand; [3]UFMG; [4]UFVJM; [5]PUC-MG; [6]UNIFEI; [7]Raro Labs

ID: 10146
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)
Keywords: transmission, reliability, probabilistic modeling, Monte Carlo, simulation

Transmission System Reliability in the Face of Climate Change

Razib HASAN[1], Matthew VIELE[1], William WINTERS[1], John HAUFLER[1], David J. ALLEN[2]
[1]Con Edison, United States of America; [2]The Risk Research Group, United States of America

ID: 10152
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)
Keywords: conductive clothing, AC induction, induced voltage, induced current, proximity work

Development of a Novel Conductive Garment for Protecting Linemen against Transmission Line Induction

Eduardo RAMIREZ BETTONI[1], Balint NEMETH[3], Richard CSELKO[2]
[1]Xcel Energy, United States of America; [2]High Voltage Laboratory Budapest (BME), Hungary; [3]Electrostatics Ltd., Hungary

ID: 10304
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)

Next-Generation Intelligent Maintenance for Over-Head Electric Power Facilities Using Edge Cloud Collaboration

Hua WU[1], Xiaojing BAI[1], Zengguang OU[2], Qi ZHANG[2]
[1]North China Electric Power University, China; [2]Huawei Cloud, China

ID: 10306
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)

Altitude correction method of electromagnetic environment for HVDC transmission line and its engineering application

Luxing ZHAO[1], Lei GAO[2], Jiayu LU[1], Chao LIU[2], Li XIE[1], Yong JU[1], Feng BAI[1]
[1]China Electric Power Research Institute, China; [2]Electric Power Research Institute of State Grid Tibet Electric Power Co., Ltd.

ID: 10361
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)

Experience Use of Bird Protection Devices on Power Lines and Environmental Impacts

E.V. LIAPUNOV, Y.V. ZHILKINA
Federal Grid Company of Unified Energy System

ID: 10448
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)

Powergrid Experience on Installation of Transmission Line Arresters in EHV Transmission line

Navin Kumar MAHATO
Power Grid Corporation of India Ltd.

ID: 10546
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)

Safe Management of Work in High-Voltage Overhead Lines in The Netherlands

J.R. MEIJERS[1], S.P. GELDERBLOM[2]
[1]QIRION; [2]SPIE

ID: 10576
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)

Optimization of Vegetation Management with Lidar Inspection. Real Application Case

David Ernesto GOMEZ
INTERCOLOMBIA

ID: 10719
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)
Keywords: Environmental impact;mitigation;110 kV

Environmental impact mitigation for new 110 kV line in natural protected area

Jean-François GOFFINET, N. BLANPAIN, R. MARCHAL, B. VAN ZEGBROECK
ELIA

ID: 10775
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)
Keywords: Magnetic field, Environmental Impact, Passive Loops, Overhead lines

Design and protection criteria for passive loops on a 400 kV double circuit line

Lorenzo PAPI, Luca BUONO, Piero BERARDI, Gianluigi GEMELLI, Francesco PALONE, Alberto PICCININ, Roberto SPEZIE, Marco VALENTE
TERNA RETE ITALIA S.p.A

ID: 10776
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)
Keywords: Overhead lines, Environmental Impact, Resilience, Grid-flexibility, Pole Mounted Switchgear

Refurbishment of sectionalizing posts on 245 kV towers for a reduced visual impact and an increased line resilience

Francesco PALONE, Roberto SPEZIE, Andrea VALANT, Dario POLINELLI, Luca BUONO
TERNA S.p.A. Italy

ID: 10888
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)
Keywords: Helicopter, Tower, lifting, Power line, footprint, Eurocode.

Overhead towers specially designed to be lift by helicopters.

Bruno BARONIAN
AIRTELIS

ID: 10889
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)
Keywords: Keywords Compositepylon, composite insulators, public acceptance, environmental impact

2x400kV composite pylon ready for use, nnovative and compact – reducing the impact of OHTL considerable

Stéphane MORICE[1], H SKOUBOE[2], E FREDERIKSEN[3], Julien BROCARD[4], M DOMM[5]
[1]NEXANS; [2]BYSTRUP; [3]VALMONT; [4]DERVAUX; [5]REINHAUSEN POWER COMPOSITES

ID: 10908
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)

Compliance analysis of exposure limit values of power frequency electromagnetic fields during live-line working on HV overhead lines

Iván HIGUERO-TORRES[1], Guillem GIL-PRIETO[1], Vicente FUSTER-ROIG[2]
[1]Instituto Tecnológico de la Energía (ITE); [2]Instituto de Tecnología Eléctrica, Universitat Politècnica de València

ID: 10915
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)

A wearable system for Work at Height Safety Management

Pablo RODRÍGUEZ[1], Carmen Mª PEDRAZA[1], Carlos RODRÍGUEZ[1], Rafael MESIA[1], Javier VALDÉS[2], Abel SANCHO[2]
[1]Grupo Red Eléctrica; [2]Advanced Optical Systems

ID: 11145
B2 OVERHEAD LINES - Full Papers
Topics: PS3 - Environmental and Safety Aspects from OHL (joint PS with C3)

Correlation of the Surface Wettability and the Audible Noise Emission of Overhead Line Conductors

Hannah KIRCHNER, C. M. FRANCK
ETH Zürich, Switzerland

B3 - SUBSTATIONS & ELECTRICAL INSTALLATIONS

PS 1 INCREASED IMPACT OF CLEAN ENERGY TRANSITION ON SUBSTATION DESIGN

ID: 10454
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS1 - Increased Impact of Clean Energy Transition on Substation Design

Battery Energy Storage System at Low Voltage Electricity Distribution Network – A Case Study

Naveen NAGPAL, Sugandhita WADHERA
BSES Rajdhani Power Limited (BRPL), India

ID: 10671
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS1 - Increased Impact of Clean Energy Transition on Substation Design
Keywords: data center, power supply, sustainable

An incremental approach to sustainable data center power supply

Alexandre OUDALOV[1], M. GIESE[2], K. LAINEZ AMAYA[3], S. TROLLE[3]
[1]Hitachi Energy Switzerland; [2]Hitachi ABB Powergrids Germany; [3]Hitachi ABB Powergrids Sweden

ID: 10890
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS1 - Increased Impact of Clean Energy Transition on Substation Design

Distributed subsea substation for Offshore Renewable Energy collection architectures and compliance with metal-enclosed switchgear's normative references

Isabelle NAJARRE, F. JACQUIER, A GIRODET, M HENRIKSEN, L DALMAR
SuperGrid Institute

ID: 10891
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS1 - Increased Impact of Clean Energy Transition on Substation Design
Keywords: HV compact Indoor Air Insulated Substation, GIS, Technical strategy, QUINET

RTE compact substation industrial strategy due to clean energy transition

Bastien GUERINI, Antoine PETIT
RTE France

ID: 10902
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS1 - Increased Impact of Clean Energy Transition on Substation Design
Keywords: switchgear, offshore wind, high voltage, wind turbine connection, offshore array

PASS M00 Wind – A versatile and robust 66 kV switchgear solution for offshore wind tower

Ennio ERRICO
Hitachi ABB Power Grids Italy S.p.A.

ID: 10998
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS1 - Increased Impact of Clean Energy Transition on Substation Design
Keywords: Substation, TPA, RE, STATCOM, Relocatable Containerized STATCOM (RC STATCOM), Relocation and Containerized solution

Design and Consideration for Relocatable Containerised STATCOM Installation to Provide Grid Flexibility and Stability

Nabhat CHAIYAPHAN
TNC-CIGRE, Thailand

ID: 11001
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS1 - Increased Impact of Clean Energy Transition on Substation Design
Keywords: RE, BESS, Substation, RE smoothing, Safety in design, Lithium-ion battery, Grid Scale

Pilot Project Grid Scale BESS in EGAT system

Suriya PRUNGKHWUNMUANG, Jaruwan PIPHATMONGKOLPORN, Wasin APHICHATO
TNC-CIGRE, Thailand

ID: 11079
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS1 - Increased Impact of Clean Energy Transition on Substation Design

Feasibility Tests of a 320 kV Gas-insulated DC Switchgear with Clean Air

Karsten JUHRE[1], Maria KOSSE[2]
[1]Siemens Energy, Germany; [2]Technische Universität Berlin, Germany

PS 2 SUSTAINABILITY MANAGEMENT CHALLENGES IN SUBSTATIONS

ID: 10107
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: SF6-free, Fluoronitrile, C4-FN, C4-FN/CO2/O2, EHS, toxicity, REACH

Health and safety assessment of an SF6-alternative gas technology

Fabrice PERROT[1], Yannick KIEFFEL[2], Bertrand PORTAL[2], Maxime PERRET[3], Jason BONK[4], John OWENS[4], Rainer KURZ[5]
[1]GE United Kingdom; [2]GE France; [3]GE Switzerland; [4]3M Company United States; [5]3M Deutschland GmbH Germany

ID: 10139
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations

New Electrical Automation Engineer Profile and Curriculum

M MENDES
Itaipu Binacional

ID: 10140
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations

Use of Additive Manufacturing in the Maintenance of Static Compensator

IonyA PINHEL
Furnas Centrais Elétricas S.A.

ID: 10210
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: greenhouse gases, embodied carbon, Global Warming Potential GWP), Environmental Product Declaration (EPD), Building Information Modeling (BIM)

Using BIM Technology to Promote the Sustainability of Electrical Substation Projects

Prapon SOMBOONYANON[1], Lyndsey COVERT[1], Brian PALMER[2]
[1]Burns & McDonnell, United States of America; [2]Burns & McDonnell, United Kingdom

ID: 10258
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations

Short-circuit Currents Management at Hydro-Quebec Uprating Versus Limiting Solutions Study

Frédérick DUBÉ
Hydro-Québec

ID: 10318
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: Reliability Management, Maintenance Free, Condition Monitoring, Quality improvement

Reliability Management Strategy for Power Systems Maintenance free

Jaejung KIM, Changhui KIM
HYOSUNG Corporation, Korea, Republic of (South Korea)

ID: 10321
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: Mobile solution, Substation, Cost down

Mobile Solution for Substation Intervention

Minsoo LEE, Ilhoon MOON, Taesung RHO
HYOSUNG HEAVY INDUSTRIES, Korea, Republic of (South Korea)

ID: 10672
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: C4F7N

Return of experience on high voltage equipment in operation using C4F7N mixtures

Maxime PERRET[1], M.M. WALTER[1], Robert LUESCHER[1], Y. KIEFFEL[2], D. LEGUIZAMON-CABRA[2], T. BERTELOOT[2]
[1]GE Grid Solutions Switzerland; [2]GE Grid Solutions France

ID: 10673
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: SF6, sealing switchgear compartments

Improved sealing of SF6 gas insulated switchgear compartments

Patrick C. STOLLER, Nathan MUEHLBERG, Loic FAVE, Patrick P. MEIER
Hitachi Energy Switzerland

ID: 10674
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: SF6, SF6 alternative, insulation gas, life cyle, high voltage

Life cycle comparison of different high voltage substation technologies using SF6 and alternative insulation gases

M. TREIER[1], L. PERRET[1], Y. KIEFFEL[2], E. LAURELLE[2], B. PORTAL[2], I. HUET[2]
[1]GE Grid Solutions Switzerland; [2]GE Grid Solutions France

ID: 10699
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: maintenance, reliability, power transformer

Economic Maintenance Planning of Power Transformer for Expected Cost

Joongwoo SHIN, Jaechul KIM, Kwanghoon YOON
Soongsil University, Korea, Republic of (South Korea)

ID: 10734
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: Knowledge transfer, On the Job Training, PPT framework, Skill, MR - 3DCAD, Digitalization

Knowledge Transfer of Substation Engineering and Experiences in Japan

Yuichiro YAMANE[1], Toshiyuki SAIDA[2], Akira IWATA[3], Koichi TAKETA[4], Ryo SAEKI[5]
[1]Hitachi, Ltd.; [2]Toshiba Energy Systems & Solutions Corp.; [3]Chubu Electric Power Grid Co., Inc.; [4]Kansai Transmission and Distribution, Inc.; [5]TEPCO Power Grid, Inc.

ID: 10735
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: 500 kV Substation, Replacement Work, Maintaining Equipment Reliability, Improving Maintainability and Operability, Resilience, Minimizing De-energization Area and Duration

Life Management and Improvement of Reliability, Maintainability and Operability of 500 kV Substations by Replacing Ageing Equipment

Koichi TAKETA[1], Yasuhito HASHIBA[1], Shinya KAWANO[1], Keita ITO[2], Mieko NAKANO[2], Hiroyuki HAMA[2]
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ID: 10736
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: Switchgear, SF6 gas, Leakage, Handling standard, Alternative, Study group, Requirement

Management of SF6 Gas Leakage from Substation Equipment and Technical Guidelines on Application of Substation Equipment using SF6 Alternative Gases in Japan

Keisuke NAKAMURA[1], Shigeyuki TSUKAO[1], Takanori NISHIOKA[2], Koichi TAKETA[3], Toshiyuki UCHII[4], Hiroyuki HAMA[5]
[1]TEPCO Power Grid, Inc.; [2]Chubu Electric Power Grid Co., Inc.; [3]Kansai Transmission and Distribution, Inc.; [4]Toshiba Energy Systems & Solutions Co.; [5]Mitsubishi Electric Co.

ID: 10737
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: Resilience, Inundation, Hazard map, Robot, Mobile substation, Waterproof

Resilience Reinforcement of Substations in Japan

Takanori NISHIOKA[1], Mitsunao IWATA[1], Takashi CHIBA[2], Koichi TAKETA[3], Satoshi ICHIHARA[4]
[1]Chubu Electric Power Grid Co., Inc.; [2]Tohoku Electric Power Network Co., Inc.; [3]Kansai Transmission and Distribution, Inc.; [4]TEPCO Power Grid, Inc.

ID: 10892
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: SF6 free, load-break switch, cyber-security, Shunt Vacuum Interruption, LPVT

The Ring Main Unit of the future for MV distribution networks: sustainable, digital and designed with circular environmental perspectives

Christophe PREVE[1], Stéphane GADAY[1], Venanzio FERRARO[1], Thierry CORMENIER[1], Dominique SERVE[1], François TRICHON[1], Daniel PICCOZ[2]
[1]SCHNEIDER ELECTRIC; [2]Daniel PICCOZ SASU France

ID: 10893
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: EHV Substation, Nuclear Power Plant, Disconnecting Circuit Breaker, SF6 gas

Innovative “3D architecture” for an air-insulated substation of nuclear power plant

Damien JOUAN[1], Christophe ELLEAU[2]
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ID: 10894
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations
Keywords: SF6 free-gas, Fluoronitrile, 420 kV, Gas Insulated Line (GIL), Retrofit, Global Warming Potential (GWP)

Way to retrofit 420 kV GIL with fluoronitrile-based gas mix

Thibaut MAUFFREY
GENERAL ELECTRIC France

ID: 10972
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations

Seismic Level Criteria for Electrical Substations in Colombia and Peru According to IEEE 693

Luis MUNOZ
ISA

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations

TSO perspectives on 40 years of GIS evolution, including SF6 issues, maintenance strategy and specifications recommendations.

Guilhem BLANCHET[1], C. LEPOSTEC[2], M. INVERSIN[3]
[1]Statnett SF, Norway; [2]Hydro Quebec, Canada; [3]RTe, France

ID: 11081
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations

End-of-life procedures and gas reconditioning of SF6 alternative gas mixtures

Sebastian GLOMB[1], Peter PILZECKER[2]
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ID: 11082
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations

First F-gas-free and climate neutral insulated 420 kV GIS busducts installation at TransnetBW

Mark KUSCHEL[1], Laurentiu Viorel BADICU[2]
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ID: 11167
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS2 - Sustainability Management Challenges in Substations

Contribution to the reduction of global environmental impact through the introduction of environmentally friendly distribution substation

Hiroki KATO
Chubu Electric Power Grid Co., Inc. Japan

PS 3 INTEGRATION OF INTELLIGENCE ON SUBSTATIONS (JOINT PS WITH B5)

See also B5 PS3

ID: 10188
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: IEC 61850, digital substation, artificial intelligence, synchrophasors, sampled values

Data Sources for Machine Learning Applications in IEC 61850-based Digital Substations

Alexander APOSTOLOV
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ID: 10189
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: substation design, building information modelling, intelligent design, information technology, BIM software

Results and Lessons Learned from Early Adopters of BIM Technology for Substation Design

Arnold FRY
POWER Engineers, United States of America

ID: 10192
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: IEC 61850, digital smart substation, goose messaging, sampled values, 8500 prints

ComEd's Experience with IEC 61850 at a Digital Smart Substation

John BETTLER, Matthew ROSS
Commonwealth Edison Company, United States of America

ID: 10194
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: substation, robotics, circuit breakers, remote racking, semi-autonomous

Semi-Autonomous Robot for Medium-Voltage Switchgear

Sergo SAGARELI[1], Aalap SHAH[2]
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ID: 10207
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: Estimation Based Protection (EBP), centralized substation protection, hidden failures, self-healing, coordination free protection

Resilient Cyber Secure Centralized Substation Protection

Athanasios P. MELIOPOULOS[1], George J. COKKINIDES[1], Paul MYRDA[2], Evangelos FARANTATOS[2], Ramadan ELMOUDI[3], Bruce FARDANESH[3], George STEFOPOULOS[4], Clifton BLACK[5]
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ID: 10208
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: waveform analysis, incipient fault detection, condition-based maintenance, waveform monitoring

Substation-based Waveform Analytics Monitoring System for Improved Circuit Awareness

Jeffrey A. WISCHKAEMPER, Carl L. BENNER, B. Don RUSSELL, Karthick MANIVANNAN
Texas A&M University, United States of America

ID: 10259
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)

Condition Assessment of Substation Apparatus - The Challenges of Turning Dreams into Reality

Claude RAJOTTE
Hydro-Québec

ID: 10284
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: machine learning, out-of-distribution, hybrid machine learning

Practical Machine Learning Applications

Tony MCGRAIL[1], Tom RHODES[3], Imene MITICHE[4], Falk WERNER[1], Philip BOREHAM[2]
[1]Doble Engineering, United States of America; [2]Doble Engineering, United Kingdom; [3]Duke Energy, United States of America; [4]Glasgow Caledonian University, United Kingdom

ID: 10288
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: condition monitoring, response plan, contextual analysis

Lessons from Action Planning Based on Transformer Condition Monitoring

Tony MCGRAIL[1], Phillip PROUT[2], Steven RHOADS[2], Jamie BEARDSALL[3], Mark ROWBOTTOM[3], Tommy SALMON[4], Philip BOREHAM[5]
[1]Doble Engineering, United States of America; [2]National Grid, United States of America; [3]Drax Power, United Kingdom; [4]Dominion Energy, United States of America; [5]Doble Engineering, United Kingdom

ID: 10313
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)

Research and Judgement on Technical Development Trend of Substation Secondary System in China

Mingjie LI[1], Yu LIU[1], Zhihuai SHU[1], Zexin ZHOU[1], Zhongqing LI[2], Renhui DOU[2], Xuewei DOU[2]
[1]State Grid of China, China; [2]China Electric Power Research Institute China, China

ID: 10315
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)

Panoramic perception of substation equipment and smart maintenance technology

Renhui DOU[1], Naichao CHANG[2], Yang SUN[2], Chen FAN[1], Zexin ZHOU[1]
[1]State Grid of China, China; [2]China Electric Power Research Institute China, China

ID: 10319
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: AHMS(Asset Health Management System), Substation, Mozambique

Application of Substation Asset Health Management System(AHMS) for a Utility in Mozambique

Hwangdong SEO, Sungjik KIM, Jaeryong JUNG
HYOSUNG Corporation, Korea, Republic of (South Korea)

ID: 10366
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)

Integrated Intellectual Automated System of Monitoring, Diagnosis and Control of Power Transformer Stock Technical Condition

D.A. VODENNIKOV[1], I.V. DAVIDENKO[2], A.V. SELIKHANOVICH[3], L.M. POSPEEV[3]
[1]Federal Grid Company of Unified Energy System; [2]Ural Federal University named after the first President of Russia B.N. Yeltsin; [3]"MTK Biznes.Optima" LLC

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)

Autonomous Software and Hardware Complex for Preventing Technological Defects of the Basic Substation's Equipment Based on Remote Monitoring Data

G.K. GLADKOVSKII[1], I.L. ARKHIPOV[1], D.S. KAPUSTIN[1], E.V. MAGADEEV[1], A.V. SELIKHANOVICH[2]
[1]Rosseti; [2]«MTK Business.Optima» LLC

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)

In-house developed tool for automatic extraction of Disturbance Record Files from IEDs and transfer it to cloud storage using capabilities of IEC 61850 Standard & File Transfer Protocol

Sanjay JADAV
Gujarat Energy Transmission Corporation Limited (GETCO)

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)

Utility experience of real time monitoring of 765kV Circuit breaker and Reactor using advanced sensors and cloud-based asset performance management

Nihar RAJ
Adani Transmission Ltd.

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)

An Intelligent approach for Remote Asset monitoring of substation using Visual Monitoring System

Anoop KUMAR
Power Grid Corporation of India Ltd.

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)

Implementation Experience of India's First 400 kV Process bus based full digital substation

Ritesh KUMAR
Power Grid Corporation of India Ltd.

ID: 10639
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: Electrical Installations, Online Monitoring, Data Analytics, Low Voltage Network, Electrification of Transport

Online Monitoring and Data Analytics Enabling LV Network Investment Optimisation for a Low Carbon Future in Ireland

Jack HERRING, J FITZGERALD, F PIENAAR, C POWER, H CUNNINGHAM, Dan CANTANASE, EJ SILKE
Cigre Irish National Committee, Ireland

ID: 10738
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: Substation Maintenance, Outdoor patrol tasks, Inspection Robot, Crawler, Autonomously driving

Development of Crawler-Type Robot for Substation Patrol Inspection

Tetsuya OKAZAKI[1], Ryousuke HATANO[1], Keita ITO[2], Takeshi MAEDA[2], Masashi KITAYAMA[2]
[1]Chubu Electric Power Grid Co., Inc.; [2]Mitsubishi Electric Corporation

ID: 10739
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: Digitalization, Digital Substation, ICT, IoT, Sensor, GIS, GIT, SIS, PD, RIP bushing

Development of sensing Tools for Construction of digital Substations and Enhancement of Reliability through early Identification of Facility Abnormalities

Masaaki NAKAHATA[1], Keisuke YOKOHATA[1], Kiyotaka BABA[1], Kensuke ODAJIMA[2], Ryuichi SUZUKI[3], Tsutomu TERADA[4]
[1]TEPCO Power Grid, Inc.; [2]Toshiba Energy Systems & Solutions Co.; [3]TAKAOKA TOKO CO., LTD.; [4]MEIDENSHA CORP.

ID: 10777
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: Monitoring, switchgear, circuit breaker, asset performance management, on-site

A versatile and future-proof condition monitoring system for high voltage switchgear

Sebastiano SCARPACI[1], Tim SCHULZE-KOENIG[2], Stephan SEHESTEDT[2], Lennard MERKERT[2], Ralf GRAF[2], Dominique CACHIN[3]
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ID: 10901
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: Monitoring, SF6-alternatives, SF6-free, Digital Twin, Asset Performance Management, IEC 61850

Challenges and trends rising on switchgear monitoring and control applications

Nicolas GADACZ[1], Marius CATALA[1], Jean-Luc RAYON[1], J SHARIF-ASKARY[2], E STELLA[3]
[1]GENERAL ELECTRIC France; [2]CENERAL ELECTRIC USA; [3]GENERAL ELECTRIC Italy

ID: 10904
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: IEC 61850, Functional Specification, System Configuration, System Specification, Application Scheme

IEC 61850 specification process applied to classic customer project

Camille BLOCH[1], Christoph BENNAUER[2], Navdeep AHUJA[1], Thoams STERCKX[3]
[1]SCHNEIDER ELECTRIC FRANCE; [2]SCHENIDER ELECTRIC GERMANY; [3]ELIA

ID: 10905
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: LPIT Low-power instrument transformer, IEC 61850-9-2, IEC 61869, process bus, Gas Insulated Switchgear (GIS)

New approach for the on-site calibration of a LPIT in GIS and lessons learned

Laurent-Didier ROUX[1], Gérard CHARROT[2], Wojciech OLSZEWSKI[3], Franz-Werner. GATZEN[3]
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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)

Application of IEC61850 – a DNO approach

Zigor OJINAGA, María ANZOLA, David MACDONALD
i-DE Redes Eléctricas Inteligentes

ID: 11000
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: Digital Substation, IEC 61850, Smart Grid, Substation Renovation

Challenges and experiences on renovation of EGAT's conventional substation to IEC 61850 based digital substation

Kanathip SANTAYANON, Praikanok LERTWANITROT
TNC-CIGRE, Thailand

ID: 11002
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)
Keywords: Digital Substation, IEC 61850, Smart Grid, Energy Storage, IEDs, BCU, SCADA

EGAT experience on integration between traditional and IEC 61850 control and protection system applied for grid scale energy storage

Anek WUTHAYAVANICH, Thanakrit KITTIWARARAT, Chindarha HANGSAJARA, Kanathip SANTAYANON
TNC-CIGRE, Thailand

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B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)

Test, Installation and Operational Experiences on World's First Substation Integrating Digital, Intelligent and Greenhouse-Gas Free T&D Equipment

Marcel ENGEL[1], Fred OECHSLE[2]
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ID: 11078
B3 SUBSTATIONS AND ELECTRICAL INSTALLATIONS - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS with B5)

EHV and DC Substation Post Insulators with Integrated Monitoring System

Jens Seifert SEIFERT
Maschinenfabrik Reinhausen GmbH, Germany

B4 - DC SYSTEMS & POWER ELECTRONICS

PS 1 HVDC SYSTEMS AND THEIR APPLICATIONS

ID: 10109
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications
Keywords: Bipole VSC-HVDC, dynamic EMT studies, stability assessment, integrated offshore HVDC schemes

Modelling and stability Assessment of integrated offshore HVDC networks

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ID: 10110
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications
Keywords: HVDC, DC-DC converters, DC Transmission Grids

Test Systems and Models for DC/DC Converters intended for DC Transmission Grid Applications

D JOVCIC[1], A DARBANDI[2], P DWORAKOWSKI[3]
[1]University of Aberdeen United Kingdom; [2]Manitoba Hydro International Canada; [3]SuperGrid Institute France

ID: 10111
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications
Keywords: HVDC, HVDC offshore, VSC, power density, offshore transmission, IEC61850, Optical Instrument Transformers

HVDC technology advancements for the integration of an Offshore Wind Farm (Sofia Project)nd their integration in the Design of the Sofia offshore Wind Farm

Kevin DYKE[1], Matheu RAMET[1], John VODDEN[1], Leandro VACIRCA[1], Raymond TIEU[2], Christopher SMITH[3]
[1]GE Grid Solutions United Kingdom; [2]Sembmarine Singapore; [3]RWE Renewables United Kingdom

ID: 10112
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications
Keywords: HVDC, harmonics performance, harmonic stability, frequency domain simulations, time domain simulations, harmonic design converter method.

The Harmonic Loci-Based Control Design: Practical Methods in Frequency and Time Domain for a Consistent Design of VSC HVDC Harmonic Active Solutions

Jose MONTEIRO[1], Omar JASIM[1], Elisabetta LAVOPA[1], Hani SAAD[2], Sarath WIJESINGHE[3]
[1]GE Renewable Energy United Kingdom; [2]RTE International France; [3]RWE Renewables United Kingdom

ID: 10113
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications
Keywords: Bipolar Balance Control Strategy (BBCS), three-terminal HVDC, electrode system

A novel control Strategy of bipolar Balance for multi-terminal HVDC and its application on a three-terminal HVDC Project

Ziming SONG[3], Qi GUO[1], Libin HUANG[1], Mengjun LIAO[2], Lijun DENG[2], Mingzhang SU[2]
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ID: 10141
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications

The Multi-terminal Hybrid HVDC Benchmark Model

P PORTUGAL[1], W CAO[2], Y ZHOU3[2], S XU[2]
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ID: 10143
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications

LCC-HVDC and Hybrid LCC-MMC-HVDC Transmission: A Comparison in the Brazilian Power System

E WATANABE[1], R DIAS[1], L PROENÇA[1], A PEDROSO[1], A ALVES[1], J MOOR[2], B CHUCO[2], C VIZEU[3], J GRAHAM[4], P ESMERALDO[4], A TIETZ[4]
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ID: 10211
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications
Keywords: modulated multilevel converters, dc fault current blocking, HVDC transmission systems

Novel HVDC MMC VSC Topology with DC Fault Current Limiting Capability

Ram ADAPA[1], Mojtaba MOHADDES[2], Shaahin FILIZADEH[3], Nuwan HERATH[3]
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ID: 10212
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications
Keywords: Modular Multilevel Converter (MMC), grid forming, neutral bus ground switch, flashover, overhead line

Clearance of Temporary Faults in MMC-HVDC Overhead Line Transmission

Neil KIRBY[1], Andrzej ADAMCZYK[2], John FRADLEY[2], Carl BARKER[2]
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ID: 10213
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications
Keywords: HVDC IED capability description, HVDC digital substation, IEC 61850 system configuration

Use of IEC 61850 in HVDC

Ajay KOLIWAD[1], Yu DU[2], Jonathan ALLCOCK[2]
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ID: 10246
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications
Keywords: HVDC, thyristor valves, voltage stresses, PCAV, operating conditions, LCC HVDC, thyristor valve design

Study on the Converter Valve Peak Voltage of Bukdangjin-Godeok HVDC System under Various Operating Condition

Sunyoung LIM, Hyungbae MOON, Panyoung SUNG, Byungil AHN, Gyeongsu PARK
KAPES

ID: 10260
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications

Mutual Electromagnetic Interaction Between VSC-HVDC Underground Cable Systems and HVAC Systems in Germany

Joanne HU
RBJ Engineering Corp.

ID: 10261
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications

Business Case Analysis for the Songo Converter Station

Dan KELL
Hatch

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications

A New High-Frequency Resonance Suppression Strategy for VSC-HVDC System

Guiyuan LI, Weihuang HUANG, Hong RAO, Yan LI, Shukai XU, Changyue ZOU, Junjie FENG
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ID: 10320
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications

Design and Development of Multi-terminal Hybrid UHVDC Control and Protection System

Jiang LU[1], Yunlong DONG[1], Zongyue GAN[2], Yangzheng WANG[1], Yu LU[1], Jie TIAN[1], Haiying LI[1]
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ID: 10322
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications

Operation mode and post-fault recovery of bipole VSC-HVDC system with offshore wind farms connection

Xiao ZHOU, Congda HAN, Jie YANG, Zhiyuan HE
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ID: 10323
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications
Keywords: HVDC, Simulink, Xilinx System, HILS, Verification

HVDC Controller with Model-Based Design and Verification through HILS

Hyojin KANG, Sungmin OH, Junchol LEE, Hyunho YOO, Hongju JUNG
HYOSUNG Corporation, Korea, Republic of (South Korea)

ID: 10327
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications

Review of the Electrical Topology of High-voltage High-capacity DC/DC Converters

Qiang LI, Guangfu TANG, Xiaoguang WEI, Xinying WANG, Kaidong TAN
Global Energy Interconnection Research Institute Co., Ltd, China

ID: 10328
B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS1 - HVDC Systems and their Applications

Design and Research of DC Filter for LCC-MMC Multi-terminal HVDC Transmission System

Qingming XIN, Ying HUANG, Xiaobin ZHAO, Shukai XU, Yuxin LU, Dizhen XU
China Southern Power Grid, China

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System Commissioning Test of the UHV LCC-VSC MTDC Project

Shukai XU[1], Yuebin ZHOU[1], Hong RAO[1], Jun CHEN[1], Changyue ZOU[1], Wei WEI[1], Yu YANG[1], Wanyu CAO[1], Chenglin REN[1], Yulong HU[2]
[1]Electric Power Research Institute (State Key Laboratory of HVDC), CSG, China; [2]Ultrahigh Voltage Transmission Company, CSG, China

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DC Interconnection of Adjacent Point-to-Point HVDC Links as an Enabling Step towards Multiterminal HVDC Systems

Staffan NORRGA[1], Ilka JAHN[2], Cornelis A PLET[3], Philipp RUFFING[2], Geraint CHAFFEY[4], John N M MOORE[5], Maksym SEMENYUK[6]
[1]KTH Royal Institute of Technology, Sweden; [2]RWTH Aachen University, Germany; [3]DNV Energy Systems, Canada; [4]KU Leuven, Belgium; [5]Consultant, Netherlands; [6]DNV, Netherlands

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UTN (Universidad Tecnológica Nacional)

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Keywords: HVDC Transmission - Converter, Thyristor – Refurbishment - Control & Protection System - Bipole, Monopole - Ground Return, Metallic Return, Frequency Control

±180kV, 300MW KEPCO BP1 Haenam–Jeju HVDC Scheme Refurbishment – Key Features and Execution Experiences

Byungil AHN[1], Amit KUMAR[2], Yogesh GUPTA[3], Manoj KUMAR[3], Fan GUO[2], Nicolas MOLINIER[2], David HANSON[2], Kyoungsoo SONG[4], Panyoung SUNG[1]
[1]KAPES, Korea, Republic of (South Korea); [2]General Electric, United Kingdom; [3]General Electric, India; [4]KEPCO, Korea, Republic of (South Korea)

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Topics: PS1 - HVDC Systems and their Applications
Keywords: Multi-terminal HVDC, Mutivendor, Interoperability, Real-time simulation

Standard Specifications and Simulation Analysis on Control and Protection Scheme for Multivendor Offshore Multi-Terminal HVDC System

Tatsuhito NAKAJIMA[1], Fumihiko OHTA[2], Masaki MIDORIKAWA[3], Rina KUME[4], Tohru YOSHIHARA[5], Tsunehisa WACHI[6]
[1]Tokyo City University; [2]Tokyo Electric Power Company Holdings, Incorporated; [3]TEPCO Power Grid, Incorporated; [4]Toshiba Energy Systems & Solutions Corporation; [5]Hitachi, Ltd.; [6]J-POWER Business Service Corporation

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Topics: PS1 - HVDC Systems and their Applications
Keywords: VSC HVDC, MMC-VSC, Artificial ground fault test, Actual ground fault

Results of Ground Fault Test and Response to actual Ground Fault of New Hokkaido-Honshu HVDC Link

Tatsuya NAGAI[1], Masanori MORI[1], Takanori UCHIUMI[1], Hirokazu MATSUMOTO[2], Yuki CHIBA[3]
[1]Hokkaido Electric Power Network, Inc.; [2]CRIEPI; [3]Toshiba Energy Systems & Solutions Corp.

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Topics: PS1 - HVDC Systems and their Applications
Keywords: HVDC, Resonance, Protection, Inrush Current, Redundancy of AC Filters, Multi Vendor, Real Time Digital Simulator, Emergency Start

System Study and Commissioning Test of the Hida-Shinano HVDC Link

Masanori TAKECHI[1], Masahito KANEKO[1], Taizou MATSUDA[2], Ryuutarou HAJIRI[2], Takeru MURAO[3], Naoki KAWAMURA[4]
[1]TEPCO Power Grid, Inc.; [2]Chubu Electric Power Grid Co., Inc.; [3]Toshiba Energy Systems& Solutions Corporation; [4]Hitachi, Ltd.

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Topics: PS1 - HVDC Systems and their Applications
Keywords: HVDC link, interconnection, coal phase-out

Tyrrhenian Link – a paramount project to achieve the decarbonization of the Italian power system

Ennio LUCIANO, Francesco DEL PIZZO, Luca PIEMONTI, Temistocle BAFFA SCIROCCO, Pietro CAPURSO, Francesco DI CUONZO, Andrea URBANELLI
TERNA Rete Elettrica Nazionale Italy

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Keywords: LCC, VSC, polarity reversal, commutation failures, black start

High performance HVDC – LCC converters for the new SaCol 3 link: Preliminary analysis and simulations

Francesco PALONE[1], Antonio BATTAGLIA[1], Luca BUONO[1], Massimo MARZINOTTO[1], Sino PATTI[1], Stefano LAURIA[2]
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Topics: PS1 - HVDC Systems and their Applications
Keywords: LCC HVDC, Design

±500kV, 3000MW Bipole LCC HVDC Transmission Bukdangjin - Godeok Project– Key Design Aspects

Panyoung SUNG[1], Amit KUMAR[2], Yogesh GUPTA[3], Narasimha BOYALLA[2], Bruno KAYIBABU[2], Gearoid OHEIDHIN[2], Nicolas MOLINIER[2], Mark POWELL[2], Junhang LEE[4]
[1]KAPES, Korea, Republic of (South Korea); [2]GE, United Kingdom; [3]GE, India; [4]KEPCO, Korea, Republic of (South Korea)

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Topics: PS1 - HVDC Systems and their Applications
Keywords: Power Flow Controller, Current Flow Controller, High Voltage, Direct Current, Multi-terminal

Integration of power flow controllers in HVDC grids

Florent MOREL, Joan SAU BASSOLS, Sellé TOURE, Serge POULLAIN, Franck JACQUIER
SUPERGRID INSTITUTE

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Topics: PS1 - HVDC Systems and their Applications
Keywords: Hardware in the loop, HVDC, control interactions, multi-vendor, real time simulation

Parallel operation of a multi-vendor HVDC scheme between France and UK – IFA2000 and Eleclink interaction studies

Marco SCHUDEL, Julien MICHEL, Sébastien DENNETIERE, Hani SAAD
RTE France

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Topics: PS1 - HVDC Systems and their Applications
Keywords: Voltage Source Converter, HVDC, Alternate Arm Converter, Modular Multilevel Converter, DC voltage control

EMT Simulation of an HVDC link based on extended overlap-alternate arm converter

Pierre VERMEERSCH[1], François GRUSON[1], Philippe EGROT[2], Xavier GUILLAUD[1], Frédéric COLAS[1]
[1]Univ. Lille,-Arts et Metiers Institute of Technology -Centrale Lille - L2EP; [2]EDF

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Severity adapted fault clearing strategy for MTDC grids including cables and overhead lines

Pascal TORWELLE[1], Bertrand RAISON[2], Trung Dung LE[3], Marc PETIT[3], Alberto BERTINATO[1]
[1]SUPERGRID INSTITUTE; [2]G2Elab-Université Grenoble; [3]GeePS, CentraleSupelec

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Keywords: HVDC, Performance, Data, Collection, Sharing, Co-operation, Improvement

Improving HVDC Performance Data Collection and Sharing

Patrik LINDBLAD
Fingrid Oyj

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Transmission System testing of a VSC based HVDC System

Magne MEISINGSET[1], C. G. A. KOREMAN[2], A. VINOTH[3], H. S. ANDERSSON[3]
[1]Statnett, Norway; [2]TenneT, Netherlands; [3]Hitachi, Sweden

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A transparent process to ensure appropriate and compliant grid-forming behaviour for HVDC systems and FACTS - A TSO perspective

Max GOERTZ[1], Simon WENIG[2]
[1]TransnetBW, Germany; [2]TransnetBW, Germany

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European offshore grid: On protection system design for radial bipolar multi-terminal HVDC networks

Patrick DUELLMANN
RWTH Aachen University

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Methods and requirements for the upgrade of HVDC and STATCOM solutions with Grid Forming functions for Multi-level converter topologies

S M Iftekharul HUQ
Siemens Energy, Germany

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Online Estimation of Dynamic Capacity of VSC-HVDC Systems - Proof of Concept in NordLink

Kevin SCHOENLEBER[1], Susanne SCHMITT[2]
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Survey of the Reliability of HVDC Systems throughout World during 2019 – 2020

Murray BENNETT
Stantec, Canada, On behalf of Study Committee B4

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Offshore Grid Forming Control in Parallel VSC HVDC Bipole Systems

Riley ST. HILAIRE
TransGrid Solutions, Canada

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Hypergrid: towards the Italian electricity grid of the future

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Terna Rete Elettrica Nazionale, Italy

PS 2 DC FOR DISTRIBUTION SYSTEMS

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Topics: PS2 - DC for Distribution Systems
Keywords: ANGLE-DC project, MVDC, cascaded 3L-NPC converters, testbed, demonstration

Laboratory Demonstration of a Cascaded Three-Level Neutral-Point-Clamped Converter for Medium-Voltage DC Transmission

Carlos UGALDE_LOO, J CHEN, W MING, S WANG
Cardiff University, United Kingdom

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Experience of Modelling Converter Based Devices in Indian Power System

Priyam JAIN
Power System Operation Corporation Limited

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Topics: PS2 - DC for Distribution Systems

Physical Model based Monte Carlo for Early Failure Analysis of a Switching Mode Power Supply used in HVDC Transmissions

Yi ZHANG, Hui Dong HWANG, Young Mo GU, Jaejung KIM, Frede BLAABJERG, Huai WANG
CIGRE Denmark, Denmark

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Topics: PS2 - DC for Distribution Systems
Keywords: Direct current system, medium voltage, power electronics, indirect DC converter, boost converter

Unidirectional step-up isolated DC-DC converter for MVDC electrical networks

Piotr DWORAKOWSKI[1], Pierre LE METAYER[1], Drazen DUJIC[2], Cyril BUTTAY[3]
[1]SUPERGRID INSTITUTE; [2]EPFL; [3]CNRS-ECL-INSA Lyon

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Modified ON-OFF Control for Very High Frequency Class E DC-DC Converter with Efficiency Improvement

Ying LI
University of Nottingham, United Kingdom

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B4 DC SYSTEMS AND POWER ELECTRONICS - Full Papers
Topics: PS3 - FACTS and Power Electronic (PE)
Keywords: Power Electronics – Power Flow Control – Modular Static Synchronous Series Compensation – Dynamic Performance – Distance Protection – Real-Time Simulation

Real Time dynamic Performance, control interaction and protection Studies of modular static synchronous series compensation Technology in the Great Britain Transmission System

David BARRON[1], Afshin PASHAEI[1], Mark OSBORNE[1], Dionysios STAMATIADIS[2], Panos XENOS[2], Babis MARMARAS[2], Daniel SCHWEER[3], Francesca Madia MELE[3]
[1]National Grid, United Kingdom; [2]Smart Wires Greece; [3]Smart Wires Ireland

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SVC Applications in Brazil - Basic Design Evaluation, Modeling, and Integration Studies

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AC-AC Solid-State Distribution Transformer

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Application of Power Electronics to Enhance Synchronous Condenser Performance

Mojtaba MOHADDES
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STATCOM Refurbishment and Lifecycle Considerations in a Steelmaking Application

Andrew J OWENS[1], Tobias BALSNER[1], Yannos WIKSTRÖM[1], Jonas NILSSON[2], Daniel FAHLGREN[3]
[1]Hitachi Energy, Sweden; [2]Uddeholm AB; [3]Ellevio AB

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Energy Storage Enhanced STATCOM for Secure and Stable Power Grids

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First Modular Static Synchronous Series Compensation Installation in Latin America – From Planning to Operation

Giovanni MARIN
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Delivery of Modular Static Synchronous Series Compensators on the Greek Transmission System to Provide Substantial Increase in Cross-Border Interconnection Capacity

Konstantinos PLAKAS[1], Christos-Spyridon KARAVAS[1], Konstantinos KROMMYDAS[1], Andreas KURASHVILI[1], George PAPAIOANNOU[1], Panagiotis XENOS[2]
[1]IPTO, Greece; [2]Smart Wires Inc., Greece

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Topics: PS3 - FACTS and Power Electronic (PE)
Keywords: Grid Forming Control, Supercapacitor, Energy Storage System, FNN Guideline, Inertia Support, RoCoF, Fast Frequency Response, Renewable Energy System, Virtual Synchronous Machine, FACTS System

Grid-forming FACTS Systems for Increased Renewable Generation Penetration

Frederick PAGE, Kazuyori TAHATA, Ryosuke UDA, Hiroki ISHIHARA, Kota HAMANAKA
Mitsubishi Electric Corp.

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Topics: PS3 - FACTS and Power Electronic (PE)
Keywords: Oscillation Damping; Reactive Power, STATCOM, Transmission Stability

125 Mvar STATCOM systems for oscillation damping and supporting HVDC-LCC reactive power unbalance

Francesco PALONE, Cosimo PISANI, Giorgio GIANNUZZI, Benedetto ALUISIO, Luca BUONO, Lorenzo AVELLINO
TERNA S.p.A. Italy

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Topics: PS3 - FACTS and Power Electronic (PE)
Keywords: FACTS, BESS, VRE integration, FACTS with BESS, Weak power system

FACTS with energy storage for renewable integration in Georgia power system

Giorgi ARZIANI, Teona ELIZARASHVILI
Parvus Consulting, Georgia

B5 - PROTECTION & AUTOMATION

PS 1 ADDRESSING PROTECTION RELATED CHALLENGES IN NETWORK WITH LOW-INERTIA AND LOW FAULT-CURRENT LEVELS

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS1 - Addressing Protection Related Challenges in Network with Low-Inertia and Low Fault-Current Level
Keywords: Renewable Energy, Inverter Based Resource, Power System Protection, Distance Protection

Impact of renewable generation Resource on the distance Protection and Solutions

C VENKATESH[1], Ilia VOLOH[2]
[1]GE Grid Solutions, United Kingdom; [2]GE Grid Solutions, Canada

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS1 - Addressing Protection Related Challenges in Network with Low-Inertia and Low Fault-Current Level
Keywords: Wide area protection, inertia, stability, islanding, system integrity protection, disturbances.

Wide area protection Scheme for prevention of islanding of South Australia

Douglas WILSON[1], Sean NORRIS[1], Devinda PERERA[2], Leonardo TORRELLI[3]
[1]GE Digital, United Kingdom; [2]Electranet Australia; [3]CSE Uniserve Australia

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Topics: PS1 - Addressing Protection Related Challenges in Network with Low-Inertia and Low Fault-Current Level

Influence of Inverters Based Sources on Protections Devices

C AVIZ[1], F REIS[2], G GUENZI[3], G FABRIS[4], F COSTA[4], R FERNANDES[5]
[1]Aviz Consultoria; [2]Universidade E. Rio de Janeiro; [3]Energoconsult; [4]Eletrobras; [5]Unicamp

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS1 - Addressing Protection Related Challenges in Network with Low-Inertia and Low Fault-Current Level

From Hertz to Megahertz: Lessons Learned About the Impact of Inverter-Based Wind Turbine Generators on the Protection of Interconnecting Lines

L LOPES[1], K SILVA[2], R FILHO[3], A NETO[4], M DAVI[5], F VASQUÉZ[2], T HONORATO[2], R REIS[6], P JUNIOR[7]
[1]Federal University of Paraíba (UFPB); [2]University of Brasilia (UnB); [3]ESC Engineering; [4]National Electric Systems Operator (ONS); [5]Federal University of Triangulo Mineiro (UFTM); [6]Federal Rural University of Pernambuco (UFRPE); [7]Conprove Industry and Commerce

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS1 - Addressing Protection Related Challenges in Network with Low-Inertia and Low Fault-Current Level
Keywords: Inverter-Based Resource (IBR), protection, IEC 61850, GOOSE

Reducing the Fault Clearing Times in Networks with Inverter-based DERs

Alexander APOSTOLOV
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS1 - Addressing Protection Related Challenges in Network with Low-Inertia and Low Fault-Current Level

Thinking and practice of relay protection strategy for power system with high proportion of renewable energy and power electronics

ZeXin ZHOU, Yarong GUO, Hong CAO, Xingguo WANG
China Electric Power Research Institute Co., Ltd., China

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS1 - Addressing Protection Related Challenges in Network with Low-Inertia and Low Fault-Current Level

Renewable Energy Protection challenges & Overview of Pre-synchronization study for RE (Wind & Solar) Generation in Southern Regional Grid in India

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS1 - Addressing Protection Related Challenges in Network with Low-Inertia and Low Fault-Current Level

Testing and Analyzing of Distance Protection of a Realistic Offshore Wind Farm Transmission System

Kasper DE KORTE[1], Gerwin VAN DIJK[1], Yilmaz YELGIN[2], Jose CHAVEZ[3], Marjan POPOV[3]
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS1 - Addressing Protection Related Challenges in Network with Low-Inertia and Low Fault-Current Level
Keywords: Power system, Resilience, Emergency Frequency Control, Renewable Energy Sources, Selfdisconnection Characteristics, Under-frequency Relay, Rate of Change of Frequency Relay, Intelligent Electric Device, Merging Unit, IEC 61850

Experimental Validation of Emergency Frequency Control by considering the Self-disconnection Characteristics of Renewable Energy Sources to enhance the Resilience and Decarbonization Aspects of Power Systems

Hayato SATOH, Noriyuki UEDA, Muneki MASUDA, Hideo KOSEKI, Hiroyuki AMANO
Central Research Institute of Electric Power Industry

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS1 - Addressing Protection Related Challenges in Network with Low-Inertia and Low Fault-Current Level

Impact of low Network Inertia on System transient Stability

Urban RUDEZ[1], Adrian KELLY[2], Koji YAMASHITA[3], Yoav SHARON[4], Ray ZHANG[5]
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Topics: PS1 - Addressing Protection Related Challenges in Network with Low-Inertia and Low Fault-Current Level

Protection in Island Systems Operating with High RES Penetration : Case Study Astypalea

Dimitrios LAGOS[1], Alkistis KONTOU[1], Panos KOTSAMPOPOULOS[1], George KORRES[1], Nikos HATZIARGYRIOU[1], Vasilis PAPASPILIOTOPOULOS[2], Vasilis KLEFTAKIS[2], Despina KOUKOULA[3], Theodora PATSAKA[3]
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS1 - Addressing Protection Related Challenges in Network with Low-Inertia and Low Fault-Current Level
Keywords: Protection Automation and Control Systems (PACS), IEC 61850, IED Configurator Tool, UML, SCL

Engineering process and tools to support the specification, configuration, qualification and operation of substations based on IEC 61850 over their whole lifecycle

Thierry COSTE, Aurélie DEHOUCK, G AUDOUSSET, Q LEBOURG, B GEORGE, K KAMGA
EDF

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS1 - Addressing Protection Related Challenges in Network with Low-Inertia and Low Fault-Current Level

Advanced transformer protection to secure discriminating internal faults from inrush currents in inverter-based generation networks

Frank MIESKE[1], Sebastian SCHNEIDER[2]
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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control

Requirements and Technological Trends on Stand Alone Merging Units

A PIRES[1], H LEON[1], L GROPOSO[1], R MAO[2]
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ID: 10191
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control
Keywords: synchrophasors, machine learning, fault analysis, modelling, simulation

Use of Machine Learning on PMU Data for Transmission System Fault Analysis

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[1]Texas A&M University, United States of America; [2]Temple University, United States of America; [3]Quanta Technology, United States of America

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control
Keywords: IEC 61850, digital substations, centralized protection, functional testing

Functional Testing of Centralized Protection Systems

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Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control
Keywords: asset management, centralization, containers, cyber security, hypervisor

Common Substation Platform: Utility Requirements Assessment

Paul MYRDA[1], Herb FALK[2]
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Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control

CPC Architectures for Small Distribution Substations

José MENDEZ
GE Grid Solutions Canada

ID: 10305
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control
Keywords: integrated protection-planning simulation, underfrequency load shedding, inverter-based resources, rate of change of frequency, NERC Standard PRC-006-5

Optimizing Underfrequency Load Shedding Strategies to Improve System Reliability

Ce ZHENG[1], Ashok GOPALAKRISHNAN[1], Sandro G. AQUILES-PEREZ[1], Kevin W. JONES[2], Reza GANJAVI[3], Yimai DONG[1]
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B5 PROTECTION AND AUTOMATION - Full Papers
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Fault Identification and Location Scheme Based on MMC Type Pseudo-bipolar DC Distribution Network

Yongsheng LIU, Jun CHEN, Wei HOU, Chong WANG, Wenlong WANG
NR Electric Co., Ltd., China

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Intelligent Automatic Control of Isolated Operating Power System

A. ZHUKOV[1], E. SATSUK[1], A.A. LISITSYN[2], A. GERASIMOV[2], B. ANDRONOVICH[2]
[1]JSC “System Operator of the Unified Power System”; [2]JSC «STC UPS»

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Experience in the Development and Implementation of an Intelligent PAC System with a Flexible Functional Architecture

A. ZHUKOV[1], A. LEBEDEV[2], A. VOLOSHIN[2], E. VOLOSHIN[3]
[1]JSC «SO UPS»; [2]NTI center at MPEI; [3]LLC «SmartEPS»

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control

Development of Stability Monitoring, Emergency Control and Relay Protection Issues Based on Online Analysis of Dynamic Properties of Power Systems

A. ZHUKOV[1], E. SATSUK[1], D. DUBININ[1], V. VASILEV[1], A. MOKEEV[2], A. POPOV[3]
[1]JSC "System Operator of the Unified Power System"; [2]NARFU; [3]Energoservice

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Practical Investigation of the Operation of Optical Current Transformers and Electronic Voltage Transformers Under Transient Conditions at 500 kV Substation

N.A. IVANOV[1], R.I. KANAFEEV[2], M.A. YANIN[2]
[1]Skolkovo Institute of Science and Technology; [2]PROFOTECH JSC

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control

Cable Section Fault Identification System for Mixed 110 kV and Higher Overhead-cable Lines Application Experience

G.S. NUDELMAN[1], S.V. BALASHOV[1], E.Y. EROKHIN[1], A.V. SDOBIN[1], A.A. SHAPEEV[1], V.G. ALEKSEEV[2], V.V. SMEKALOV[2], S.A. ARUTYUNOV[3]
[1]JSC «VNIIR»; [2]JSC «RDC FGC UES»; [3]PJSC «FGC UES»

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Automation of Step-down Substations Using New Technologies

D. ULYANOV[1], V. BOVYKIN[1], S. PISKUNOV[1], A. MOKEEV[2], E. KHROMTSOV[2]
[1]ENERGOSERVICE; [2]NARFU

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control

Study of Impact of Exclusion of line reactor curent on distance protection function and fault locator for an IEC 61850 process bus compliant IED using Hardware-in-Loop simulation

Pradeep Tanaji PATIL
Power Grid Corporation of India Ltd.

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control

System accuracy evaluation of metering application based on optical current Low Power Instrument Transformers (LPIT) and IEC 61850 SV static energy meters

I. TANNEMAAT[1], E. SCHENKEL[1], G. RIETVELD[2], A. GALLASTEGI[3], M. ACHTERKAMP[4]
[1]TSO TenneT; [2]VSL; [3]ARTECHE; [4]KEMA

ID: 10612
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control
Keywords: Line Current Differential Relay, IP Network, Layer 2 Switch, Asynchronous, Phasor

Line Protection Relay with IP Network

Takayuki INUI[1], Takahiro MORI[2], Yoshinobu UEDA[3]
[1]Kansai Transmission & Distribution Co., Inc.; [2]Toshiba Energy Systems & Solutions Corporation; [3]Meidensha Corporation

ID: 10614
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control
Keywords: Process bus, Sampling timing synchronisation, Oversampling, Optical splitter

Verification of a New Protection Relay System based on High Reliable Process Bus with Oversampling

Takuya ITO[1], Yujiro FURUSAWA[2], Yotaro NOSE[3], Toshinori SHIMIZU[4]
[1]Chubu Electric Power Grid Co., Inc.; [2]Fuji Electric Corp.; [3]Toshiba Energy Systems & Solutions Corp.; [4]Mitsubishi Electric Corp.

ID: 10675
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control
Keywords: virtual, digital substation

Virtualization as an enabler for digital substation deployment

Peter KREUTZER[1], Julio OLIVEIRA[2]
[1]Hitachi Energy Switzerland; [2]Hitachi ABB Powergrids Brazil

ID: 10751
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control
Keywords: MV, DSOs, ICT, WAPS, 5G

Defining a Wide Area Protection System Using 5G Communication Technology

Mohand BELAID, V. AUDEBERT, B. DENEUVILLE
EDF R&D, France

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control

Experiences with the deployment of centralized protection systems using virtual protection relays for substations with large power electronic converters

Hans BJÖRKLUND
Hitachi Energy, Sweden

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control
Keywords: Compensated neutral; Continuity of supply; Earth fault protection; Faulted phase earthing; Neutral injection systems; Quantitative risk assessment

Hybrid neutral treatment solutions to support post-pandemic changes in work practices, economic recovery and de-carbonisation efforts

Hugh BORLAND, L FICKERT
Cigre Irish National Committee, Ireland

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control

Automated Hardware in the Loop Test Bed For Protection Relays Using a Decision Three Algorithm

Hernan SANCHEZ
XM E.S.P. S.A

ID: 11054
B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control
Keywords: Conductor Breaking, Overhead Line (OH), Internet of Things

Algorithms for automatic detection of faults/harmful events on 132-150 kV overhead lines

Chiara VERGINE[1], Luca BARISON[1], Enrico Maria CARLINI[1], Alessio MARCHESIN[1], Davide RAMPAZZO[1], Stefano QUAIA[2], Alessandro MAURI[2]
[1]TERNA, Italy; [2]Università degli studi di Trieste

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Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control

The Rise of the Digital Twin Applications from a single Protection Device to full Digital Substations

Christian ROMEIS[1], Jan Henzgen HENZGEN[2]
[1]Siemens AG, Germany; [2]Siemens AG, Germany

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Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control

Experiences with Fault Location in Different Networks Applying Travelling Wave Technology

Cezary DZIENIS[1], Joerg BLUMSCHEIN[2]
[1]Siemens AG, Germany; [2]Siemens AG, Germany

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Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control

Using Machine Learning to Detect High Impedance Faults

I PHAFULA
Eskom Holdings Limited

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Topics: PS2 - Applications of Emerging Technology for Protection, Automation and Control

Modernizing Power Plant : moving towards situational Awareness

Jean RAYMOND
HYDRO QUEBEC

PS 3 INTEGRATION OF INTELLIGENCE ON SUBSTATIONS (JOINT PS WITH B3)

See also B3 PS3

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)

Analysis of Network Monitoring in the Context of IEC 61850

P JUNIOR[1], R BERNADINO[2], G SALGE[1], C MARTINS[1], P PEREIRA[2], G LOURENÇO[2]
[1]Conprove Ind. e Comércio; [2]Conprove Engenharia

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)

Itaipu and ANDE preparation for the Paraguayan-Argentinian Interconnection

J PESENTE, R OLIVEIRA, A TOCHETTO, A SZOSTAK, J SANTOS, M RIOS, P GALASSI, J GODOY, E RODRIGUEZ, G AGUAYO
Itaipu Binacional

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)

Advantages of Full Digital Substations with architecture based on Process Interface Units (PIU)

A PIRES, H LEON, L PINTOS, P MONTANER
GE Grid Solutions

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)
Keywords: Merging Unit, Process Bus, Electronic Transformer, Digital Substation

The Development of Merging Unit based on Process Bus for Electronic Transformer in the Digital Substation

J. H. LEE, J. Y. JUNG
KEPCO KDN

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)

Implementation of Protection Operation Analysis and Fault Management System Based on Fault Data Aggregation and Detailed Digital Simulation

Dmitry YASKO[1], Oleg FEDOROV[2]
[1]JSC «System Operator of the United Power System»; [2]JSC «RTSoft»

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)

Improvement in Asset Management of EHV Substations through remote operations – Case Studies.

Nitin SINGH
Power Grid Corporation of India Ltd.

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)

Testing in a process Bus based full digital substation-A Utility's Experience

Prakash CHANDRA
Power Grid Corporation of India Ltd.

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)
Keywords: Digital Substation, IEC61850, top-down-engineering, testing

Large scale application of fully digital substations at Landsnet

Birkir HEIMISSON[1], Theodór JÓNSSON[1], Priyanka MOHAPATRA[2], Fred STEINHAUSER[2]
[1]Landsnet, Iceland; [2]OMICRON electronics GmbH, Austria

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)
Keywords: digital substation, IoT, sensor data, digital enterprise

Integration of Digital Substation IoT Sensor Data into a digital Entrprise

Peter KREUTZER[1], Julio OLIVEIRA[2]
[1]Hitachi Energy Switzerland; [2]Hitachi ABB Powergrids Brazil

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)
Keywords: standard, intelligence, IEC 61850, digital substation

Reaping the benefits of new standards editions for better integration of intelligence in IEC 61850 digital substations

Stefan MEIER[1], Ivan GORIN[2], Krzysztof DRZYZDZYK[2]
[1]Hitachi Energy Switzerland; [2]Hitachi ABB Powergrids Poland

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)

Novel approach to implementation of fully digital substation Expectations on pilot project Sigtuna 130/20 kV substatio

Anders JOHNSSON[1], Florin STELEA[2], Yiming WU[3], David EROL[3]
[1]Vattenfall Eldistribution, Sweden; [2]DNV Sweden, Sweden; [3]Vattenfall, Sweden

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)
Keywords: Protection Automation and Control Systems (PACS), IEC 61850, IED Configurator Tool, Engineering approach, E-Monitoring

Digital substation for EDF: engineering approach and E-monitoring devlopment

Valentin BOUVIGNIES, Sylvain AUPETIT, Ryan BELTRANDO
EDF

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Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)

Process bus busbar distributed protection development

Rafael TOLEDO, Begoña FERRAS, Iker SAN SEBASTIAN, Javier CELADA
Ingeteam Power Technology S.A.

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)

Engineering and Condition Monitoring in Digital Substations- an initiative to implement Digital Substations in the Norwegian Power Grid

Nargis HURZUK[1], Karl EIDE POLLESTAD[2], M. ISTAD[3], H. K. MEYER[3]
[1]Statnett, Norway; [2]Elvia, Norway; [3]SINTEF Energy Research, Norway

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B5 PROTECTION AND AUTOMATION - Full Papers
Topics: PS3 - Integration of Intelligence on Substations (Joint PS With B3)

Reliability enhancement through machine learning combined with advanced digital methods for the performance evaluation of transformers and reactors

Karsten VIERECK[1], Anatoli SAVELIEV[2]
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C1 - POWER SYSTEM DEVELOPMENT & ECONOMICS

PS 1 SYSTEM TRANSITION RESILIENCE & ASSET MANAGEMENT RESPONSE

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Topics: PS1 - System Transition Resilience & Asset Management Response

Sectionalizing Transmission Lines, an Expansion Planning Challenge, Amplified by Unexpected Emerging Variable Renewable Generation and Environmental Restrictions

D CARVALHO, D SOUZA, M CURY, M FARINHA, R FERREIRA, T MELLO, F LIMA
EPE - Empresa de Pesquisa Energética

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C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS - Full Papers
Topics: PS1 - System Transition Resilience & Asset Management Response
Keywords: scoring methodologies, stochastic systems, modeling for operations, variable renewable energy sources, renewable generation

Risk Modelling in the Decarbonization of Electric Systems

Alberto J. LAMADRID L.[1], Timothy D. MOUNT[2], Wooyoung JEON[3]
[1]Lehigh University, United States of America; [2]Cornell University, United States of America; [3]Chonnam National University, South Korea

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Research on Transmission Expansion Planning Considering Resilience Enhancement of Power Grid

Tao LIN[1], Hui DU[1], Qingyan LI[1], Ruyu BI[2], Xialing XU[3]
[1]Wuhan University, China; [2]State Grid Hubei Electric Power Co., Ltd, China; [3]Central China Branch of State Grid Corporation of China, China

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Application of a Deterministic Chaos Theory and Artificial Intelligence Methods for Predicting Accidents in Electric Grids of European Russia

I.M. GALIASKAROV, M.Sh. MISRIKHANOV, V.N. RYABCHENKO, Yu.V. SHAROV, A.V. SHUNTOV, N.E. VASILENKO
NRU “MPEI”

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C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS - Full Papers
Topics: PS1 - System Transition Resilience & Asset Management Response
Keywords: Asset management method, Power distribution equipment risk, Kaplan-Meier method, Weibull approximation, Time based management, Value based management

Development of Asset Management Method for Power Distribution Equipment

Keita FUKUGAWA, Fumiaki MORISHIGE, Junpei YOSHIKAWA, Hidehiro YAMAMOTO, Takaya SHIGETOU
Chubu Electric Power Grid Co.,Inc.

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Topics: PS1 - System Transition Resilience & Asset Management Response
Keywords: energy transition, decarbonisation, power utilities, asset management, complexity, developing countries, Bosnia and Herzegovina.

Asset Management as a Framework for Energy Transition of Power Utilities in Developing Countries

Anes KAZAGIC[1], Dragan KOMLJENOVIC[2], Emira KOZAREVIC[3], Hasan AVDIC[3], Nedim SULJIC[3], Admir SOFTIC[4], Ognjen MARKOVIC[5], Dinko MARIC[6]
[1]EPBiH Power Utility, Bosnia and Herzegovina; [2]Hydro-Quebec’s Research Institute, Canada; [3]University of Tuzla , Bosnia and Herzegovina; [4]Ministry of Foreign Trade and Economic Relations - MOFTER, Bosnia and Herzegovina; [5]Center for Sustainable Energy Transition - ReSET, Bosnia and Herzegovina; [6]EPHZHB Power Utility, Bosnia and Herzegovina

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C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS - Full Papers
Topics: PS1 - System Transition Resilience & Asset Management Response
Keywords: Industrial internet of things, asset performance management, renewables, predictive maintenance, smart digital substation

How the industrial internet of things is driving the asset management digitalization: the implementation of an interconnected asset performance management system in the electrical power distribution sector

Alessandro PEDRETTI[1], Silvia TOFFOLI[2], Rodrigo MATEINI[2], Julio OLIVEIRA[2], Vladimir NOGUEIRA[3]
[1]Hitachi Energy Italy; [2]Hitachi Energy Brazil; [3]QUAIR Brazil

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C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS - Full Papers
Topics: PS1 - System Transition Resilience & Asset Management Response
Keywords: Probability, Power system resilience, Vulnerability

Validation and application of the methodology to compute resilience indicators for the Italian Transmission System

Emanuele CIAPESSONI[1], Diego CIRIO[1], Elisa FERRARIO[1], Matteo LACAVALLA[1], Piero MARCACCI[1], Giovanni PIROVANO[1], Andrea PITTO[1], Francesco MARZULLO[2], Federico FALORNI[2], Francesca SCAVO[2], Alessandro LAZZARINI[2], Stefano COSTA[2], Simonetta PIERAZZO[2], Chiara VERGINE[3]
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Topics: PS1 - System Transition Resilience & Asset Management Response

Concepts for considering environmental needs and personal safety for substation design and increase the resilience of the grid

Martin STÖSSL[1], Ewald SCHWEIGER[2], Dirk HELBIG[2], Oliver DOHNKE[2]
[1]Siemens Energy Austria GmbH; [2]Siemens Energy AG

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Topics: PS1 - System Transition Resilience & Asset Management Response

Foundational data layer and data model for Transformer, Cable and GIS specific asset health application

Alexander GLEIM[1], G. ODDEN[2], Tony LUGINANO[2], J. F. LANDGRAF[2], A. WILLERSRUD[2], Arne SMISETHJELL[2], H. GRØNSETH[2]
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ID: 11004
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Topics: PS1 - System Transition Resilience & Asset Management Response

Availability of data for asset management and automated condition monitoring

Arne SMISETHJELL, H. GRØNSETH
Statnett, Norway

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C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS - Full Papers
Topics: PS1 - System Transition Resilience & Asset Management Response

Energy transition system prospective and operability studies in Spain

Agustín DÍAZ-GARCÍA, Carmen DÁVILA, Álvaro BERMEJO, Macarena MARTÍN, Eduardo LORENZO, Laura LÓPEZ, Mario LÓPEZ, Belén SEGURA, Miguel DE LA TORRE, Rosalía RIVAS
Red Eléctrica de España

PS 2 ENERGY SECTOR INTEGRATION AND TACKLING THE COMPLEXITY OF MULTI-FACETED NETWORK PROJECTS

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C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS - Full Papers
Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects
Keywords: Ancillary services, integrated energy systems, local thermal systems, demand-side management, dynamic systems simulation.

Ancillary Services provision from local thermal Systems to the electrical power System

Carlos UGALDE-LOO, Da MORALES SANDOVAL, I DE LA CRUZ, H BASTIDA, M ABEYSEKERA, Y ZHOU
Cardiff University, United Kingdom

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C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS - Full Papers
Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects
Keywords: Battery Energy Storage System (BESS), distribution planning, reliability

Storage Planning - Textbook or Secret Sauce?

Aaron SNYDER, Michele PASTORE, Vadim ZHEGLOV, Cedric BASSIL, Michael ABDELMALAK
EnerNex, United States of America

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Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects
Keywords: Renewable Portfolio Standard, 100% zero emission electricity market, Greenhouse Gas (GHG), Electric Vehicle, Hydrogen

A 100% Zero Emission Electricity Market in New York

Jinxiang ZHU[1], Hongyan LI[1], Michael KINTNER-MEYER[2], Nader SAMAAN[2], Allison CAMPBELL[2], Tony NGUYEN[2], Malini GHOSAL[2], Quan NGUYEN[2]
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Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects

Research on the regulation mechanism and comprehensive evaluation technology of power/gas conversion for clean energy consumption

Ling CHENG[1], Chang LIU[1], Xinghua ZHANG[2]
[1]China Electric Power Research Institute, China; [2]State Grid Corporation of China, China

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Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects

Research on the Planning and Configuration Method of Municipal Heating Electricity Supplementary Heating for Grid-heating Network Coupling

Sirui ZHANG[1], Hao LI[1], Qing ZHANG[2], Haidong ZHANG[2], Bingqing GUO[1], Limin JIANG[1]
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Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects

Compatibility & interoperability framework to facilitate the step-wise organic development of multi-terminal HVDC grids

C.A. PLET[1], D. VAN HERTEM[2], C. BRANTL[3], M. WANG[2], H. EVANS[4], J.N. MOORE[7], C.T. NIEUWENHOUT[5], A ARMENI[6]
[1]DNV; [2]KU Leuven; [3]RWTH Aachen; [4]CarbonTrust; [5]RU Groningen; [6]TenneT; [7]

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Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects

Mid-term Electricity Storage Needs of the Power System of Cyprus

Pantelis DRATSAS[1], George PSARROS[1], Stavros PAPATHANASIOU[1], Dimitrios EVAGOROU[2], Andreas FRIXOU[2], Andreas POULLIKKAS[2]
[1]NTUA, Greece; [2]CERA, Cyprus

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Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects

Implementation and Application of the Demand Response Mechanism and the Concept of Active Energy Complexes for the Development and Improvement of the Efficiency of UPS of Russia

M.A. KULESHOV[1], K.A. DATSKO[2], S.A. UTTS[1], Evgenia I. SMIRNOVA[1]
[1]JSC SO UPS; [2]JSC NTC UPS

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Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects

Technical Feasibility Study of Bornholm Energy Island Transmission System

L. ZENI, L. DALL, B. ISMAIL, M. SEMENYUK, T. HAASE, S. POULLAIN, A. BERTINATO, C.A. PLET
CIGRE Denmark, Denmark

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C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS - Full Papers
Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects
Keywords: Energy Storage System, System Planning, Renewable Energy, solar photovoltaic, Grid Connection

Energy Storage Planning and Grid Connection Analysis for Renewable Energy in Kinmen

Ping-Heng HO[1], Shen-Jen HSIAO[1], Tsun-Yu HSIAO[1], Peter Yuinhong LIU[2], Chen-Han WU[1], Yung-Fu WANG[1]
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Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects

Actions for the implementation of Energy Communities in Colombia

Jaime ZAPATA
XM S.A E.S.P.

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Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects
Keywords: Hydrogen, electrolysers, renewable energy variability, green hydrogen costs, CCS

Cost of green hydrogen production. The influence of electrolyser technology, res characteristics and CCS

Alessandro CLERICI[1], Samuele FURFARI[2]
[1]WEC Italy, IEEE; [2]Universite Libre de Bruxelles and European Society of Engineers and Industrialis, Belgiumts

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Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects
Keywords: Integrated Energy Systems, Energy Systems Simulation, Energy System Modeling, Power to Gas, Sector Coupling

Optimising Italian Electricity and Gas Sectors Coupling in a 2030 Decarbonized Energy System

Laura TAGLIABUE[1], Dario SIFACE[1], Fabio LANATI[1], Maria GAETA[1], Giovanni MICHELI[2], Maria Teresa VESPUCCI[2]
[1]RSE, Italy; [2]Università degli Studi di Bergamo, Italy

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Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects
Keywords: Dispatching – Flexibility - Storage - Operation - Operating Reserve – Interconnections – Renewables – Planning - Transmission Systems - Mixed Integer – KSA

KAIROS, An Innovative Tool for Planning Renewable Energies and Flexibility Options in the MENA Region: A case study on the KSA Power System

Marco STABILE[1], Pierluigi VICINI[1], Bruno COVA[1], Malik M. AL HAJJI[2], Mohannad AL GHAMDI[2]
[1]CESI S.p.A. Italy; [2]SEC/NG - Saudi Electricity Company, National Grid - Kingdom of Saudi Arabia

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Combined HVDC system approach for offshore wind power integration and interconnection

Ying-Jiang HÄFNER, Sasitharan SUBRAMANIANS, S. R. CHOUDHURY
Hitachi Energy, Sweden

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Topics: PS2 - Energy Sector Integration and Tackling the Complexity of Multi-Faceted Network Projects
Keywords: OSOWOG, Renewable Energy, CO2 emissions, Paris agreement, Interconnection, cost recovery

Interconnection of South Asia for exchanging renewable energy

Philippe LIENHART, Nicolas CHAMOLLET
EDF CIST

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Storage and Demand Response inclusion in the network extension planning process

Raúl RODRÍGUEZ-SÁNCHEZ[1], Santiago GARCÍA-LÁZARO[1], Gianluigi MIGLIAVACCA[2], Dario SIFACE[2]
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Methods to identify the optimal operating area of a grid booster

Markus GÖDDE[1], Michael DÖRING[2]
[1]UMLAUT ENERGY GMBH, Germany; [2]UMLAUT ENERGY GMBH, Germany

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Voltage Stability Risks Caused by Dynamic Interactions in Integrated Energy Systems

Jan-Peter HECKEL[1], Tom STEFFEN[2]
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German HVDC corridors as starting points for a pan-European HVDC overlay grid

Matthias MUELLER-MIENACK[1], Karsten TREPTE[2]
[1]Energy Advisory & DNV GL Energy Advisory GmbH, Germany; [2]DNV GL Energy Advisory GmbH

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Enhancing the Green Hydrogen Business Case

Angeliki LOUKATOU*, Franck TUTU, Roberto MOREIRA
EDF Energy UK R&D, United Kingdom

PS 3 PLANNING UNDER UNCERTAINTY AND WITH CHANGING EXTERNAL CONSTRAINTS

ID: 10197
C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS - Full Papers
Topics: PS3 - Planning Under Uncertainty and with Changing External Constraints
Keywords: Probabilistic stability analysis, rotor angle stability, boundary capability assessment, machine learning model, network reduction, data engineering, feature engineering

A probabilistic Approach to stability Analysis for boundary transfer capability Assessment

Diptargha CHAKRAVORTY[1], Gordon MCFADZEAN[1], Gruffudd EDWARDS[1], Max MCFARLANE[1], Dieter GUTSCHOW[1], Sami ABDELRAHMAN[2], Rasoul AZIZIPANAH-ABARGHOOEE[2]
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C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS - Full Papers
Topics: PS3 - Planning Under Uncertainty and with Changing External Constraints
Keywords: Grid-Enhancing Technologies (GETs), advanced power flow control, Dynamic Line Ratings (DLRs), topology optimization, renewable integration

Unlocking the Queue with Grid-Enhancing Technologies: Case Study of the Southwest Power Pool

Jay CASPARY[1], Jesse SCHNEIDER[1], Bruce TSUCHIDA[2], Ted BLOCH-RUBIN[3], Jon MARMILLO[4], Pablo RUIZ[5]
[1]Grid Strategies, United States of America; [2]The Brattle Group, United States of America; [3]Smart Wires, United States of America; [4]LineVision, United States of America; [5]NewGrid, United States of America

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C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS - Full Papers
Topics: PS3 - Planning Under Uncertainty and with Changing External Constraints
Keywords: Adequacy, Operational Reserve, Flexibility, Uncertainty, Renewable sources

Long-term operational reserves evaluation of multi-area systems – Portuguese case study

Helena AZEVEDO[1], Nuno MARTINS[1], Rui PINTO[1], Ricardo PEREIRA[1], Sónia VILELA[1], Pedro CAROLA[1], Fernando BATISTA[1], Mário Bruno FERREIRA[1], Manuel MATOS[2,3], Leonel CARVALHO[2], Armando LEITE DA SILVA[2,4], Mauro ROSA[2,5], Pedro VIEIRA[2,5], Erika PEQUENO[2,5]
[1]REN, Portugal; [2]INESC TEC, Portugal; [3]Faculdade de Engenharia, Universidade do Porto, Portugal; [4]Pontifícia Universidade Católica do Rio de Janeiro, Brasil; [5]Universidade Federal de Santa Catarina, Brasil

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Load Forecast Modeling Based on Power Grid Dynamics under Covid-19 Impact

Hanyang XU, Xuechun JI, Jia XUE, Kun JI, Shang GAO, Xinjian HUANG, Huihui LI, Sen LI
NARI Group Corporation, China

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A resilient improvement planning method of AC/DC hybrid urban receiver-end power grid

Jianing JIAO[1], Lu LIU[1], Haowen CHENG[1], Wenbo XUAN[2], Hui LI[2], Tianyu ZHANG[2]
[1]Key Laboratory of Control of Power Transmission and Conversion of Ministry of Education (Shanghai Jiao Tong University), China; [2]Development Planning Department, State Grid Tianjin Electric Power Company

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C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS - Full Papers
Topics: PS3 - Planning Under Uncertainty and with Changing External Constraints
Keywords: distribution planning, time-series planning, grid flexibility, Distributed Energy Resource (DER) integration, beneficial electrification

Effects of the COVID-19 Pandemic on Distribution Load Profiles

Vincent WESTFALLEN, Marina MONDELLO, Susanne AGUILAR
Commonwealth Edison, United States of America

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Energy Planning considering Citizen Participation: Optimization Models at the Service of a Better Electrical Infrastructure Expansion for Chilean Society

Alex SANTANDER[1], Juan Carlos ARANEDA[2]
[1]Ministry of Energy; [2]Coordinador Electrico Nacional

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BESS Parinas–Polpaico: Capacity Uprating of a 500 kV Transmission Line using Energy Storage

Alex ALEGRIA[1], Nicolas TURTURICI[2]
[1]Transelec; [2]Estudios Electricos

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Changing paradigm and strategy to reduce the effect of intermittent injection of Power by Renewable Generators through controlled operation of Base load Generators – A Procurer's perspective

R V SAXENA[1], G S KHANOOJA[2]
[1]M. P. Power Management Co. Ltd.; [2]M. P. Power Management Co. Ltd.

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Experience of Covid-19 Pandemic along with other extreme events in Indian Electricity Market and Progress of Market Reforms

K V N Pawan KUMAR
Power System Operation Corporation Limited

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The Gridmaster-toolbox, a step towards a new infrastructure investment paradigm

H.A.M. WURTH[1], J.N.G. VAN DINTHER[1], J.H. KWAKKEL[2], I. NIKOLIC[2], J.J. STERINGA[3], R. CALON[4], W. ZAPPA[4], A.M. VAN VOORDEN[5], C.J.H. KRUIP[6], M.G. VALIES[7]
[1]Siemens Nederland N.V.; [2]TU Delft; [3]N.V. Nederlandse Gasunie; [4]TenneT TSO; [5]Stedin Group; [6]Quintel Intelligence B.V.; [7]SmartPort

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Keywords: Non-Firm, Renewable-Energy, Grid-Interconnection

Introduction of Non-Firm Type Connection to Expand Introduction of Renewable Energy

Koichiro YAMAKI, Ryuji MIYAHARA, Nobuyuki KANEKO
TEPCO Power Grid, Inc.

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Advanced IT Tools for Distribution Network Resilience Improvement: The X-FLEX Project Demo in Xanthi

Georgios TSIROPOULOS[1], Dimitrios STRATOGIANNIS[1], Stamatia GKIALA – FIKARI[1], Markos CHAMPAKIS[1], Dimitris TRAKAS[2], Efstratios PAPOUTSIS[2], Vasilis BANOS[2], Angeliki Lydia Antonia SYRRI[2], Nikos HATZIARGYRIOU[2]
[1]HEDNO, Greece; [2]NTUA, Greece

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Topics: PS3 - Planning Under Uncertainty and with Changing External Constraints
Keywords: Grid planning, grid flexibility, storage, demand side management

The innovative FlexPlan methodology to reap the benefits of including storage and load flexibility in grid planning: methodology and regional study cases

Gianluigi MIGLIAVACCA[1], Stefania BALLAUCO[1], Hakan ERGUN[2], Maxime HANOT[3], Jawana GABRIELSKY[4], Nuno AMARO[5], Andrei MORCH[6], Raul RODRIGUEZ-SANCHEZ[7]
[1]RSE; [2]KEU Leuven; [3]N-SIDE; [4]TU Dortmund; [5]R&D Nester; [6]SINTEF Energy; [7]TECNALIA

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Determining optimal technical solutions for new transmission lines (OHL/UGC) in an early project stage to assess environmental impact and stakeholder involvement

Klemens REICH[1], Anita MACHL[1], Marc BAILLEUL[2], Rickard LUNDHOLM[3], Vaishally BHARDWAJ[3], Dirk VAN HERTEM[3]
[1]APG System Operator; [2]Borealis; [3]KU Leuven

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Active Network Management solutions and their financial implications on distribution grid development

Sofia NYSTRÖM[1], Emil HILLBERG[1], Maria EDVALL[1], Máté CSŐRE[2], Bálint BOROVICS[2], István TÁCZI[2]
[1]RISE, Sweden; [2]E.ON Észak-dunántúli Áramhálózati Zrt, Hungary

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C1 POWER SYSTEM DEVELOPMENT AND ECONOMICS - Full Papers
Topics: PS3 - Planning Under Uncertainty and with Changing External Constraints
Keywords: methodology, macro-economic

Long-Term Demand Forecast For Oman Electricity Transmission System Master Plan (2020-2040)

Hisham AL RIYAMI, Aiman AL NAAMANI, Musabah AL SIYABI, Abdullah ALHABSI, Mohamed AL HASNI
Oman Electricity Transmission Company, Oman

C2 - POWER SYSTEM OPERATION AND CONTROL

PS 1 SYSTEM CONTROL ROOM PREPAREDNESS: TODAY AND IN THE FUTURE

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Topics: PS1 - System Control Room Preparedness: Today and in The Future
Keywords: Inertia – Forecast - Wide-Area Monitoring – Synchrophasor - Phasor Measurement Unit – RoCoF - Machine Learning

Operational Metering, forecast & validation of effective Area Inertia

Stuart W A CLARK[1], Douglas H WILSON[1], Karine HAY[1], Anna BLACKWELL[2]
[1]GE, United Kingdom; [2]National Grid ESO, United Kingdom

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Keywords: Black Start – Training - Control System – Telecommunication - Distribution System Operator

Development and validation of new organisational Models and Systems for DER led Restoration

Christopher SALTER[1], Michael KENNY[1], Dozie NNABUIFE[1], Peter CHANDLER[1], Dieter GUTSCHOW[2], Diptargha CHAKRAVORTY[2]
[1]National Grid ESO, United Kingdom; [2]TNEI Services, United Kingdom

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C2 POWER SYSTEM OPERATION AND CONTROL - Full Papers
Topics: PS1 - System Control Room Preparedness: Today and in The Future
Keywords: synchrophasors, machine learning, system-wide event analysis, automated data analytics

Automated System-wide Event Detection and Classification Using Machine Learning on Synchrophasor Data

Mladen KEZUNOVIC[1], Zoran OBRADOVIC[2], Yi HU[3]
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Keywords: event detection, Kernel Density Estimation (KDE), oscillation, Phasor Measurement Unit (PMU), probability

A KDE-based Methodology for PMU Data Management and Real-time Event Detection

Yidan LU, Yuan KONG, Feng TU
American Electric Power Service Corporation (AEP), United States of America

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Potential and challenges of AI-powered decision support for short-term system operations

J.P. VIEBAHN[1], M. NAGLIC[1], A. MAROT[2], B. DONNOT[2], S.H. TINDEMANS[3]
[1]TenneT; [2]RTE; [3]TU Delft

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Wide-Frequency Measurement Technology for Power Electronics- dominated based Power Systems

Chen FAN[1], Jianguo YAO[1], Naichao CHANG[2], Yanping WU[1], Guoqing ZHAO[1], Haidong ZHANG[1], Renhui DOU[1]
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Keywords: renewable, low inertia, automatic generation control, WAMS/PMU, forecast

Challenges And Responding To The Booming Of Renewables In Vietnam's Power System

The Van NGUYEN, Duc Ninh NGUYEN, Xuan Duc DINH, Minh Quang NGUYEN, Anh Tuan NGUYEN, Thanh Trang NGUYEN
National Load Dispatch Center of Vietnam, Vietnam

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Experience of development and implementation of SOMS (System Operation Management Software)

M M HASSAN
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Reactive Power Management and Other Challenges with High Renewable Penetration: Case study of Indian grid

M VENKATESHAN[1], Suruchi JAIN[2]
[1]Power System Operation Corporation Limited; [2]Power System Operation Corporation Limited

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Impact of Silt on Hydro Stations of Northern part of Indian Power System and Enhancing the Resilience in Grid Operation through near Real Time Silt Monitoring

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A tool to detect Low frequency power system oscillations in real time using PMU data

Shashank TYAGI
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Synchrophasor-based Applications to Enhance Electrical System Performance in the Netherlands

M. POPOV[1], N. KUMAR[1], A. BORICIC[1], J. RUEDA[1], M. TEALANE[7], I TYURYUKANOV[1], M. NAGLIC[1], A. JONGEPIER[2], E. WIERENGA[3], M. VAN RIET[4], O. BAGLAYBTER[5], D. KLAAR[6]
[1]Delft University of Technology; [2]Enduris B.V.; [3]Stedin; [4]Qirion; [5]General Electric; [6]TSO TenneT; [7]

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Development of Dispatching Monitoring and Control Technology in Russia Based on PMU Data

M. GOVORUN, A. ZHUKOV, E. SATSUK, D. DUBININ, Vladimir A. DIYACHKOV
JSC “System Operator of the Unified Power System”

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Nonparametric Identification of Events in the Western Siberia Power System Based on Big Data Processing of PMU

I.M. GALIASKAROV, N.E. VASILENKO, M.Sh. MISRIKHANOV, V.N. RYABCHENKO, Yu.V. SHAROV, A.V. SHUNTOV
Russian National Committee of CIGRE, Russian Federation

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C2 POWER SYSTEM OPERATION AND CONTROL - Full Papers
Topics: PS1 - System Control Room Preparedness: Today and in The Future
Keywords: power system operation and security, control center operation, time-series clustering, HRTU

Re-establishing Functional Observability in a Control Center under Total Loss of Normal Communications using Time-series Clustering

Mahendra PATEL[1], Papiya DATTARAY[2], Lakshmi SUNDARESH[1], Sujit TRIPATHY[1], Vikas SINGHVI[1]
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Topics: PS1 - System Control Room Preparedness: Today and in The Future
Keywords: Demand Forecast - Big Data - Machine Learning - Island Power Systems

Applying Big Data Analytics to Demand Forecast in Island Power Systems towards Large Installation of Renewable Energy

Takayuki HIGO[1], Yuji HANAI[1], Kiyoshi TANAKA[2]
[1]Central Research Institute of Electric Power Industry; [2]Kyushu Electric Power Transmission and Distribution Co., Inc.

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C2 POWER SYSTEM OPERATION AND CONTROL - Full Papers
Topics: PS1 - System Control Room Preparedness: Today and in The Future
Keywords: Integrated Stability Control System, Voltage and Reactive Power Control, Artificial Intelligence, Photovoltaics, System Stability, Over-voltage, Number of Operations of Equipment

Development of New Integrated Stability Control System for Photovoltaics Introduction Expanding Grid Utilizing Artificial Intelligence

Yuuki KAWAURA[1], Nobutoshi SAITO[1], Daichi KATO[2], Ryo YAMAGUCHI[2], Masaru TAKEISHI[2]
[1]Chubu Electric Power Grid Co., Inc.; [2]Hitachi, Ltd.

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C2 POWER SYSTEM OPERATION AND CONTROL - Full Papers
Topics: PS1 - System Control Room Preparedness: Today and in The Future
Keywords: WAMPC, power system control, power system dynamics, WAMS, Dynamic mode decomposition

Wide Area Monitoring and Protection System for interarea oscillations suppression in the Italian power system

Cosimo PISANI[1], Enrico Maria CARLINI[1], Giorgio GIANNUZZI[1], Salvatore TESSITORE[2]
[1]TERNA S.p.A. Italy; [2]università di Napoli, Italy

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Topics: PS1 - System Control Room Preparedness: Today and in The Future
Keywords: Black start, Dynamic Analysis, Electric Island, Resilience, Snowstorm

Islanded Operation of the HV/MV network: a Dynamic Study based on a Real-Life Experiment Data

Chiara VERGINE[1], Enrico Maria CARLINI[1], Gaetano PECORARO[1], Mirko PIAZZA[1], Alberto BERIZZI[2], Davide FALABRETTI[2], Valentin ILEA[2], Andrea VICARIO[2]
[1]TERNA S.p.A. Italy; [2]Politecnico di Milano

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C2 POWER SYSTEM OPERATION AND CONTROL - Full Papers
Topics: PS1 - System Control Room Preparedness: Today and in The Future
Keywords: RTCA, PFC, Decision support tools, control room operation

Development of Innovative Power Flow Controller-compatible RTCA Decision Support Tools for Enhancing Control Centre Operations

Medha SUBRAMANIAN, Marie HAYDEN, Marta VAL ESCUDERO, Mark RAFFERTY, Eoin KENNEDY, Adrian KELLY
Cigre Irish National Committee, Ireland

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C2 POWER SYSTEM OPERATION AND CONTROL - Full Papers
Topics: PS1 - System Control Room Preparedness: Today and in The Future
Keywords: Power system stability, HVDC Transmission, Hybrid AC/DC Transmission Grids, Transient stability

Transient stability enhancement through the control of embedded HVDC transmission systems. Grid2030 RITSE project

Juan Carlos GONZALEZ-TORRES[1], Abdelkrim BENCHAIB[1], Hind BEKKOURI[1], Antoine GHYSELINCK[1], Louis FILLIOT[1], Antonio CORDON[2], Luis CORONADO[2], Sergio MARTINEZ[2]
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Resilience Enhancement Applications in Operational Planning and Control for the TSO of Serbia

Ninel CUKALEVSKI[1], Goran JAKUPOVIC[1], Nikola OBRADOVIC[2]
[1]Institute Mihajlo Pupin, Serbia; [2]JSC Elektromreza Srbije, Serbia

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Demonstration Project of Low Carbonization and Advancement by Online Optimized Control of Transmission System Voltage and Reactive Power utilizing ICT

Jittipath TRIYANGKULSRI, Nawanat EUA-ANANT
TNC-CIGRE, Thailand

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Handling intra-zonal constraints in the upcoming European balancing Markets

Gerard DOORMAN, M. HÅBERG, A. STRØMSNES ØVERJORDET, L. WARLAND, H. MÆLAND, Å. TVEITE
Statnett SF, Norway

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New voltage control service and VOLTAIREE project

Juan Julián PEIRÓ, José Luis PRESA, Marta CABALLERO, Javier QUINTERO, Agustín DÍAZ-GARCÍA, Sergio CORREDOR, Andrés SAINZ, Guillermo JUBERÍAS, Carmen LONGÁS, Nicolás SANTOS, Paula JUNCO, Juan BOLA
Red Eléctrica de España (REE)

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Topics: PS1 - System Control Room Preparedness: Today and in The Future

Testing of Power Oscillation detection algorithm using a Real-Time PMU laboratory

Aníbal PRADA[1], Eduardo MARTÍNEZ[1], José SALDANA[1], Marta BERNAL[1], Noemi GALAN[1], Dalibor BRNOBIC[2], Vedran GRUDENIC[2]
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Topics: PS1 - System Control Room Preparedness: Today and in The Future

Training platform for proof of future dispatcher tools

Matthias MUELLER-MIENACK[1], André LEHMANN[2]
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Ad-Hoc Determination and Activation of Remedial Actions in Electro-Thermal System Operations

Andreas KUBIS[1], Jan KEMPER[2]
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Machine Learning Using PMU Data to Predict Small Signal Disturbances

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Simulator-based operator training on power system operating procedures

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Operador Nacional do Sistema Elétrico – ONS, Brazil

PS 2 OPERATIONAL PLANNING STRATEGIES, METHODOLOGIES AND SUPPORTING TOOLS

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Brazilian Power System Operation Under Extreme Operating Conditions - Recent Examples and Proposals to Face Future Challenges

P GOMES[1], M SANTOS[2]
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Brazilian Interconnected Power System - Implementation of Wind Power Farm in Restoration Process: Practices and Experience

A GUARANI[1], N MACIEL[2], L DUDA[2]
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Brazil's Embedded HVDC Systems – Operation Planning Challenges

M NOLI, B SESSA, J CAMELO, V GUALTER
ONS – Operador Nacional do Sistema Elétrico

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Keywords: Inertia, Frequency, Stability, RoCoF, Frequency Reserve

Inertia Measurements in the GB Power System used for operations and planning Improvements

Brian BERRY[1], Antonio ENAS[1], Anna BLACKWELL[2], Stewart REID[3]
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Keywords: linear state estimation, model reduction, PMU placement, situational awareness, synchrophasors

Approach to Distribution PMU Placement and Observability Analysis

Shikhar PANDEY[1], Heng CHEN[1], Esa Aleksi PAASO[1], Farnoosh RAHMATIAN[2], Ali ALVI[1]
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Challenges and Countermeasures on Operational Planning with High Penetration of Renewable Energy Sources: Chinese Experience and Prospect

Qinyong ZHOU, Shanshan ZHAO, Libo ZHANG, Hailei HE, Dan HUANG, Haoyue GONG
State Key Laboratory of Power Grid Safety and Energy Conservation (China Electric Power Research Institute), China

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Influence of the Fault Ride-Through Control Strategy of Wind Turbines on the Transmission Power of UHVAC/DC

Shiyun XU[1], Huadong SUN[1], Deyang GUO[1], Boyang LI[2], Bing ZHAO[1]
[1]China Electric Power Research Institute, China; [2]Harbin Institute of Technology Harbin

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Low Demand Operation of a Grid with High Share of Inverter-Based Resources - South Australian Case Study

Nilesh MODI, A JALALI
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Implementation of New Dispatch Formulation and Software for Tertiary Frequency Control Reserves in Indian Power System

Saif REHMAN
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Evolution of Renewable Energy Monitoring Centre in Southern Regional Grid: Experience through Data, Forecasting and Challenges

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Power System Operation Corporation Limited

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State Estimation in Medium Voltage Distribution Networks using Pseudo Measurements

Sai Suprabhath NIBHANUPUDI[1,2], Anton ISHCHENKO[2], Simon TINDEMANS[1], Peter PALENSKY[1]
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Transition to a new regional coordination framework

D. WEIß[7], U. ZIMMERMANN[1], J.-F GAHUNGU[7], J. VAN ROOST[2], J. MØLLER BIRKEBÆK[3], T. KAPETANOVIC[4], R. PAPROCKI[5], D. KLAAR[6]
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Topics: PS2 - Operational Planning Strategies, Methodologies and Supporting Tools
Keywords: power system, blackout, machine learning, algorithm

Prediction of possible power system blackout risk with machine learning algorithms

Mert KARACELEBI[1,2], Alexandre OUDALOV[1], Yi WANG[2], Panagiotis PAPADOPOULOS[3]
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Smart Grid Flexibility Solutions for Transmission Networks with Increased RES Penetration

Ioannis GONOS[1], Christos CHRISTODOULOU[1], Christos DIKAIAKOS[2], Vassiliki VITA[1], Elias ZAFIROPOULOS[1], Ekhiotz ZUBIETA[3], Giovanna SANTAMARIA[3], Ngoc Bao LAI[4], Nicholas Gregory BALTAS[4], Pedros RODRIGUEZ[4]
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Quantifying the impact of Synchronous Inertial Response and Fast Frequency Response to Frequency Stability for high share of Renewables in HVDC interconnected Jeju system

Jaeyeop JUNG[1], Seunghyuk IM[1], Namki CHOI[1], Byongjun LEE[1], Hongseok CHOI[2], Jeonghoon SHIN[3]
[1]Korea University, Korea, Republic of (South Korea); [2]Korea Power Exchange, Korea, Republic of (South Korea); [3]KEPCO Research Institute, Korea, Republic of (South Korea)

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Keywords: Operational Planning, impact assessment, energy transition, Multi-Situations.

Year-ahead operational planning in an evolving system through multi-situation methods

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RTE France

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Practical experience of using fully automated centralized voltage regulation in transmission system

Renata RUBEŠA
HRO CIGRE, Croatia

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Technical, Regulatory and Economic Development for Distributed Flexible AC Transmission Systems – D-FACTS

Jorge GONZALEZ
UPB

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Deep Learning Application for Power Generation Forecasting of VRE in Thailand

Jarudate VORASEE, Somphop ASADAMONGKOL, Somruedee TIPMABUTR
TNC-CIGRE, Thailand

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Topology Optimization of Power Network with Renewable Energy Sources Based on an Adapted Genetic Algorithm

Andrey BRAMM[1], Alexandra KHALYASMAA[1,2], Stanislav EROSHENKO[1,2], Pavel MATRENIN[2]
[1]Ural Federal University, Russia; [2]Novosibirsk State Technical University, Russia

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Black-Start Network Restoration using Offshore Wind Power with AC cables

Leonel NORIS MARTÍNEZ*[1], Abdul Wahab KORAI[2], Victor GARCÍA SUÁREZ[3], Huub PUSTJENS[3], Volodymyr KALASHNIKOV[3], Matthias MÜLLER-MIENACK[3]
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C3 - POWER SYSTEM ENVIRONMENTAL PERFORMANCE

PS 1 SETTING AMBITIOUS CLIMATE STRATEGIES IN THE ENERGY SECTOR

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Inserting Crucial Environmental Issues into Energy Planning: Paths for Carbon Reduction

R FURTADO, M FURTADO, E FLORISSI, M FURTADO, M SILVA
Diversa Consultancy on Sustainability

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Indigenous Vulnerability and Corporate Climate Change Strategy for the Electricity Companies in Brazil

K GARCIA, L PAZ, W SILVA, I RAUPP, D MATOS, C VASCONCELLOS
Electrical Energy Research Center (CEPEL)

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The Future Landscape of China's Power System and Its Contribution to the 2060 Carbon Neutrality Target

Baoguo SHAN, Jiangtao LI
State Grid Energy Research Institute Co., Ltd., China

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Business Diversification of Coal Mining Enterprises Based on the Development of CMM Utilization Infrastructure

Kirill VARNAVSKIY[1,2], Fedor NEPSHA[3,4], Roman KOSTOMAROV[4]
[1]"KFR Energy", LLC; [2]Shandong University of Science and Technology (PRC); [3]"INTELAB", LLC; [4]T.F. Gorbachev Kuzbass State Technical University

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C3 POWER SYSTEM ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: PS1 - Setting Ambitious Climate Strategies in the Energy Sector
Keywords: Abandoned coal mines, Coal regions, Decarbonization, Energy transition, Utility scale photovoltaic power plants.

Photovoltaic Power Plants on degraded Mining, Slag and Ash dump Areas – a Contribution to Coal Region Transition Processes

Ajla MERZIC, Nedzad HASANSPAHIC, Elma REDZIC, Elvisa BECIROVIC, Nedim TURKOVIC, Almin REDZIC, Anes KAZAGIC, Mustafa MUSIC
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Techno-economic impact of large-scale RES integration in Saudi Arabia

J YASIN[1], M ALGHAMDI[1], A ALI[1], M HUSSAIN[1], M FARHAN[1], M ALZAID[1], B DUPONT[2], B NERINCX[2], C DUBOIS[2], P HENNEAUX[2], R FAHMI2[2], J DUBOIS[2], K KAROUI[2]
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Electric solidarity: a research program to model interdependence management in current power systems

Antoine GOUTALAND[1], Nathalie DEVULDER[1], Vincent RINGEISSEN[1], Blanche SEGRESTIN[2], Kevin LEVILLAIN[2]
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Keywords: Biomimicry, Biomimetics, Bioinspiration, Energy Transition, Methodology

Biomimicry and energy, a systemic eco-design approach to address the challenges of the energy and ecological transition

Eliot GRAEFF[1], Christophe GOUPIL[2], Felix GUEGUEN[2], Pierre MEYER[3], Kalina RASKIN[1], Nathalie DEVULDER[3]
[1]CEEBIOS; [2]Université Paris DIderot; [3]RTE France

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Topics: PS1 - Setting Ambitious Climate Strategies in the Energy Sector
Keywords: Decarbonisation, carbon footprint, direct GHG emissions, indirect GHG emissions, GHG emission inventory

The TSO contributions to the decarbonization of the European economy

Amélie LAFRAGETTE[1], Catherine LELONG[1], Mathilde GRESSET BOURGEOIS[1], Apolline PRADA[1], Mario SISINNI[2]
[1]RTE France; [2]TERNA SpA

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Science based targets, emission reduction and carbon neutrality strategies for TSO companies. Experience in Spain

Mercedes VÁZQUEZ MIRANDA
Grupo Red Eléctrica

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Regional Sustainability Assessment of Energy Systems: Integrating Stakeholder Perspectives and Conditions on a Regional Scale

Benjamin KRAUS[1], Witold POGANIETZ[2], Britta BUCHHOLZ[3], Johannes GAISER[1]
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Transition to Climate Neutral, Safe and Sustainable Power Grids - Benefits for Society, Grid Operators and Manufacturers

Dirk HELBIG[1], Shibani BOSE[2]
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Assessment of Life Cycle Emissions from Battery (BEV) as compared with DME-fuelled Compression Ignition Engine Vehicles

David BYRNE
EirGrid Plc, Ireland

PS 2 BIODIVERSITY AND THE SUPPLY OF ELECTRICITY, RENEWABLES-BASED OR NOT: RISKS, CHALLENGES, SOLUTIONS AND OPPORTUNITIES

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Topics: PS2 - Biodiversity and the Supply of Electricity, Renewables-Based or Not: Risks, Challenges, Solutions and Opportunities

Peixe Vivo Program: Long-Term Actions for Fish Conservation in Dammed Brazilian Rivers

R FONTES, M CASTRO, R FIORINE
Cemig Geração e Transmissão SA

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C3 POWER SYSTEM ENVIRONMENTAL PERFORMANCE - Full Papers
Topics: PS2 - Biodiversity and the Supply of Electricity, Renewables-Based or Not: Risks, Challenges, Solutions and Opportunities
Keywords: Egyptian Electricity Holding Company (EEHC) - Burullus Power Plant (BPP) – Critical Habitat Assessment (CHA) – Critical Habitat (CH) – Biodiversity Action Plan (BAP), Egyptian Environmental Affairs Agency (EEAA), International Finance Corporation (IFC)

Biodiversity Accommodation in the Burullus Power Plant Project Selection and Preservation of a Potential Protected Offset Area

Marwa Mansour HUSSEIN, Maher Aziz BEDROUS, Ismail Yehya ELSAWY
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Topics: PS2 - Biodiversity and the Supply of Electricity, Renewables-Based or Not: Risks, Challenges, Solutions and Opportunities
Keywords: Environmental Impact Assessment, Mitigation, Vegetation Management, Social Acceptance

The Characteristics of Mitigation Measures in Japan for the Impact of the Power Transmission Line on the Biodiversity

Soh KOBAYASHI, Masaki SHIRAI
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Topics: PS2 - Biodiversity and the Supply of Electricity, Renewables-Based or Not: Risks, Challenges, Solutions and Opportunities
Keywords: Benthos, renewable marine energy, artificial habitats, electromagnetic fields, heat emission

Exploring environmental impacts of submarine power cables from offshore wind farms

Lisa GARNIER[1], Bastien TAORMINA[2], Antoine CARLIER[3], Nolween QUILLIEN[2], Damien SAFFROY[1]
[1]RTE France; [2]France Energies Marine; [3]IFREMER - DYNECO-LEBCO

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A study of Hydro-floating Solar Hybrid Project impact on aquatic biodiversity : Case study for the Thailand's largest Hydro-floating Solar Hybrid Project at Sirindhorn Dam, Ubon Ratchathani Province

Kamolkarn KIJAWATWORAWET
TNC-CIGRE, Thailand

PS3 ENVIRONMENTAL AND SAFETY ASPECTS FROM OHL (JOINT PS WITH B2)

See also B2 PS3

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Topics: PS3 - Environmental and Safety Aspects from OHL (Joint with B2)

Innovative engineering solutions to overcome environmental and safety challenges and use of helicopter in Construction of Transmission lines and substations in North East of India

Dr Deepak LAKHAPATI
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Topics: PS3 - Environmental and Safety Aspects from OHL (Joint with B2)
Keywords: Bird flight diverter, Collision, Wind loading, White stork, Well-balanced management

Challenges in Solving Conflicts between Power Line Management and Bird Conservation in Japan

Masaki SHIRAI, Saki TARUISHI, Mikio SHIMIZU
CRIEPI

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Topics: PS3 - Environmental and Safety Aspects from OHL (Joint with B2)
Keywords: Corona Effect, Monitoring, Maintenance, High voltage Line

Corona effect measurement in lines with innovation projects in rep

Darwin PADILLA
Red de Energia del Peru

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PS 1 CHALLENGES AND ADVANCES IN POWER QUALITY (PQ) AND ELECTROMAGNETIC COMPATIBILITY (EMC)

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Comparison of Harmonic Study Results with Long Term Measurements to Propose a more Realistic Way to Represent the System Impedance in Harmonic Performance Studies

M CARLI, B MEYER
CGT Eletrosul

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Application of a Methodology for Determining Voltage Harmonic Contributions in a Low-Voltage Busbar

I SANTOS, B GIANESINI, G TRONCHA, R GREGORY., C AZEVEDO, V BRITO
Federal University of Uberlândia

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A Hosting Capacity Methodology for Brazilian Distribution Networks

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Assessing the Risk of Geomagnetic Disturbance on Power System from Perspective of Steady-State Security Region

Chunming LIU, Xiyan GUAN, Yiqiao HU
North China Electric Power University, China

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Critical Review of Harmonic Assessment Procedures for Transmission Customers and Renewable Generators

Tim BROWNE[1], Vic GOSBELL[2], R A BARR[3]
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Topics: PS1 - Challenges and Advances in Power Quality (PQ) and Electromagnetic Compatibility (EMC)
Keywords: Harmonic Multi-Infeed Interaction Factor (HMIIF), harmonic impedance, amplification, frequency-domain modeling, multi-frequency stability

Theory and Application of Multi-Frequency Interaction Screening Method

Kaitlyn BABIARZ, David ROOP, Samantha MORELLO
Mitsubishi Electric Power Products, Inc., United States of America

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Topics: PS1 - Challenges and Advances in Power Quality (PQ) and Electromagnetic Compatibility (EMC)
Keywords: Photovoltaic, Islanding detection function, Voltage flicker, Static synchronous compensator

Countermeasures Against Voltage Flicker by Photovoltaic Inverters with Islanding Detection Function Occurring in a Wide Area Network

Satoru AKAGI[1], Jun YOSHINAGA[1], Naoki HAYASHI[2], Satoshi UEMURA[3], Tomoaki SHOJI[3], Takayuki NAKAJIMA[4]
[1]TEPCO Power Grid, Inc.; [2]TEPCO Holdings, Inc..; [3]Central Research Institute of Electric Power Industry; [4]Denryoku Computing Center, Ltd.

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Topics: PS1 - Challenges and Advances in Power Quality (PQ) and Electromagnetic Compatibility (EMC)
Keywords: Harmonic characteristics, 5th, 7th, cancellation, transformer, distribution system, Japanese electric power system

Review of Harmonic Characteristics in the Japanese Electric Power System

Naotaka OKADA
CRIEPI

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An Estimation for Short-Circuit Power Changes in the Dutch Grid to Analyze the Impacts of Energy Transition on Voltage Dips

R. TORKZADEH[1], J.B.M. VAN WAES[2], G. MULDER[1], V. CUK[1], J.F.G. COBBEN[1]
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Integration of Photovoltaic (PV) Plants into the Railway Electricity Network of the Netherlands: Impact on the Operation of the Railway Network and Grid Code Compliance Assessment

M. POIKILIDIS[1], R. HEUCKELBACH[1], T. PLOEG[1], F. TEN HARVE[2], G. OLDE MONNIKHOF[2]
[1]DNV; [2]ProRail

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Analysis of Harmonic Propagation in Meshed Power Systems using Standing Waves

B.S. BUKH, C.L. BAK, F.F. DA SILVA
CIGRE Denmark, Denmark

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EMC Simulation Method for Multi-Level VSC HVDC Converters

Gustaf SANDBERG[1], Thomas WEISSL[1], Göran ERIKSSON[2], Didier COTTET[3], Arne SCHROEDER[3]
[1]Hitachi Energy, HVDC, Sweden; [2]Hitachi Energy Research, Sweden; [3]Hitachi Energy Research, Switzerland

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Swedish Voltage Quality Regulation Development for the Challenges Imposed by the Energy Transition

Johanna ROSENLIND[1], Herlita BOBADILLA ROBLES[1], Susanne ACKEBY[2], Daniel KARLSSON[3]
[1]Energy Markets Inspectorate (Ei), Sweden; [2]RISE, Sweden; [3]DNV, Sweden

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C4 POWER SYSTEM TECHNICAL PERFORMANCE - Full Papers
Topics: PS1 - Challenges and Advances in Power Quality (PQ) and Electromagnetic Compatibility (EMC)
Keywords: Wind farm connection, offshore grid, harmonics, filter, harmonic background

Harmonic Studies Performed by RTE for Wind Farm Connection

Quentin PIRAUD, Xavier-Marie VIEL, Julien MICHEL
RTE France

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C4 POWER SYSTEM TECHNICAL PERFORMANCE - Full Papers
Topics: PS1 - Challenges and Advances in Power Quality (PQ) and Electromagnetic Compatibility (EMC)
Keywords: DC power quality indices, ripple spectrum, DC disturbance modelling in frequency domain

DC Power Quality Assessment on real MVDC and LVDC Power Systems

Xavier YANG[1], Xingyan NIU[1], Juntao FEI[2], Chenyu ZHANG[2], Hao TONG[3], Chenchen LIU[3], Liang ZHANG[4]
[1]EDF R&D France; [2]JS EPRI China; [3]Goldencooperate Ltd China; [4]SNPDRI China

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Topics: PS1 - Challenges and Advances in Power Quality (PQ) and Electromagnetic Compatibility (EMC)

Equivalent Impedance of Wind and Solar Power Plants for AC Harmonic Performance Assessment of VSC-HVDC Systems

Philippe TREMOUILLE[1], Karolina CARVALHO[2], Juan-Carlos URREGO[1]
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C4 POWER SYSTEM TECHNICAL PERFORMANCE - Full Papers
Topics: PS1 - Challenges and Advances in Power Quality (PQ) and Electromagnetic Compatibility (EMC)
Keywords: Geomagnetically Induced Current – GIC – Geomagnetic, Disturbance, Power System, Design, Grid, Topology, Series Compensation

Impacts of Transmission System Design Principles on geomagnetically induced Currents in the Finnish Transmission Grid

Lauri ALA-MUTKA[1], Antti HARJULA[1], Liisa HAARLA[1], Krishnat PATIL[2]
[1]Fingrid Oyj; [2]Siemens

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C4 POWER SYSTEM TECHNICAL PERFORMANCE - Full Papers
Topics: PS1 - Challenges and Advances in Power Quality (PQ) and Electromagnetic Compatibility (EMC)

Measurement and Simulation of Harmonic Propagation in Transmission Systems

Robert STIEGLER[1], Jan MEYER[2]
[1]Technische Universität Dresden, Germany; [2]Technische Universität Dresden, Germany

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Topics: PS1 - Challenges and Advances in Power Quality (PQ) and Electromagnetic Compatibility (EMC)

Synthetic Signals for the Evaluation of Low-Voltage Grid's Measurement Methods

Alexander GALLARRETA*, Jon GONZÁLEZ-RAMOS, Igor FERNÁNDEZ, David DE LA VEGA, Amaia ARRINDA, Itziar ANGULO
University of the Basque Country (UPV/EHU), Spain

PS 2 CHALLENGES AND ADVANCES IN INSULATION COORDINATION AND LIGHTNING RESEARCH

ID: 10215
C4 POWER SYSTEM TECHNICAL PERFORMANCE - Full Papers
Topics: PS2 - Challenges and Advances in Insulation Coordination and Lightning Research
Keywords: distributed energy resource, ground fault overvoltage, load rejection overvoltage, ferroresonance, open phase

Transformer Configuration Impacts on Transient Phenomena in Inverter-Based Resource Dominated Distribution System - a Case Study

. MAIGHA, Sean CARR, Andreas BRANDT, Mohit SINGH
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Keywords: Direct lightning, Lightning protection design, Medium-voltage distribution lines, Lightning location system, Flashover

Lightning Performance Assessment of Japanese Medium-Voltage Overhead Distribution Lines considering Regional Characteristics

Kazuyuki ISHIMOTO[1], Koji MICHISHITA[2], Takashi EGUCHI[3], Tomoyuki SATO[4], Hitoshi SUGIMOTO[5], Yuusuke KOKUBO[6]
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Keywords: Lightning events, automatic system, automatic evaluation, lightning evaluation.

System for Automatic Evaluation of Lightning Effects on Transmission Line and Substation Equipment

Martin SVANCAR[1], Martin KNENICKY[1], Lubomir KOCIS[1], Petr SPURNY[2], Radek OVESNY[2]
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Keywords: Series Compensation, Transient Overvoltage, Transient Recovery Voltage, Trapped DC Voltage, Electromagnetic Transient, Simulation

Overvoltage simulation Studies for a series compensated Transmission Line in a meshed series compensated Network

Olli-Pekka JANHUNEN, Minna LUOJUS, Pauli PARTINEN, Liisa HAARLA
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Harmonic Filters Characteristics Effects in the Switching Manoeuvre Transient

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Topics: PS3 - Challenges and Advances in Power System Dynamics
Keywords: stability analysis, voltage source converters, small-signal modelling, network reduction.

Converter Driven Oscillation in Power Systems with High Penetration of HVDC Interconnectors

Xiaolin DING[1], Chuanyue LI[2], Jun LIANG[2], Xueguang WU[3]
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Topics: PS3 - Challenges and Advances in Power System Dynamics
Keywords: Fault Level, System Strength, Voltage Sensitivity, Power System Faults, Power System Stability

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Keywords: Blackstart, Distribution Network, Real Time Studies, Hardware in Loop Testing

Real Time Simulation and Demonstration of Black Start on Transmission Networks using Embedded Synchronous Generators

Bharath PONNALAGAN[1], Ian COWAN[1], Md RAHMAN[1], Bemjamin MARSHALL[1], Oluwole ADEUYI[1], Neil MILLER[2]
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Keywords: synchronous condenser, transient stability, grid-forming inverters, dynamic stability, inverter-based resources

System Stability with Synchronous Condensers for Power Export from Inverter Dominant Generation Regions

Matthew RICHWINE[1], Nicholas MILLER[2]
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Topics: PS3 - Challenges and Advances in Power System Dynamics
Keywords: Power system reliability, digital twin, common information model (CIM), IEC61850

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System Strength Support using Grid-Forming Energy Storage to Enable High Penetrations of Inverter-Based Resources to Operate on Weak Networks

Stephen SPROUL[1], S CHEREVATSKIY[1], S ZABIHI[1], J ZIMMERMANN[1], A OUDALOV[2]
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Keywords: aggregated assets, power system, malfunction

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Keywords: Magnetic;simulations;risk assessment;live black start;test

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Virtual C&P – A powerful simulation platform for HVDC and FACTS in present and future grids

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Cycle Life Assessment of Battery Energy Storage Systems for Primary Frequency Control by Rainflow Counting Algorithm

Mehmet CECECİ[1], Ercüment ÖZDEMİRCİ[2]
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Keywords: Grid code, power system, Hardware In the Loop, ancillary services, supervision, monitoring

Ancillary Services Supervision with Hardware In the Loop and e-Monitoring New Methods

Laurent CHATONNET[1], Thomas LESCARRET[2], Marc FLORES[1]
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Keywords: Continental Europe, System Split, Frequency Stability, Rate of Change of Frequency, Blackout

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Keywords: Isolated power systems, Battery Energy Storage System, Grid-feeding, Grid-forming, Synchronous Condensers

Taking Advantage of Grid-Forming BESS Behaviour During Major Outages: Contribution to Improve the Share of Renewable Energy in French Isolated Power Systems

Guilherme SANTOS-PEREIRA[1], F BENAVENT[2], J WITKOWSKI[3], Gregoire PRIME[1]
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Topics: PS3 - Challenges and Advances in Power System Dynamics
Keywords: High Share of Inverter Based Resources, Transient Stability, Voltage Stability, Fast Frequency Response, Voltage Dip Induced Frequency Dip, System Non-Synchronous Penetration, Data Clustering.

Stability Analysis on the Power System of Ireland and Northern Ireland for Operation with 75% Inverter-Based Resources

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Khaled AL-MAITAH[1], Abdullah AL-ODIENAT[2]
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The Transient Simulation of Battery Storage Connection to Utility Scale Solar Power Plant Under Low Inertia Scenarios in the Jordanian System

Ahmad TAHSEEN[1], Suad ALMATTAR[2]
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Topics: PS3 - Challenges and Advances in Power System Dynamics
Keywords: Sub-synchronous resonance, Waveform measurement, Frequency Scanning, WAProtector, Real-time operation

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Keywords: congestion management, renewable energy integration, market design, network investment, generation connection

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Hideki KIBATA[1], Takeshi YAMASHITA[1], Hiroshi IRIE[2], Akihisa SETTAI[2], Kazuhiko OGIMOTO[3]
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Keywords: Cross-border Electricity Trading, Renewable Energy Generations (REGs), Power System Security, Ancillary Services

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Keywords: resource adequacy, loss of load expectation, reliability, probabilistic analysis

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Derek STENCLIK[1], Aaron BLOOM[2], Gord STEPHEN[3], Wesley COLE[3], Armando FIGUEROA ACEVEDO[4], Aidan TUOHY[5], Genevieve DE MIJOLLA[5]

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Julian EGGLESTON[1], David BONES[2], Christian ZUUR[1], James HYATT[1], Ed HAWKINS[1], David REYNOLDS[1], Jack O'BRIEN[2]
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Keywords: Supply-Demand Balance, Fuel Shortage, LNG Stock, Price Spike, Capacity Market, Missing Money

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Keywords: Capacity market, Balancing market, Renewable energy installation, Carbon Neutrality

Evolution of Japanese Market Design and Regulation to secure appropriate Reliability and Price Rationalization

Yu TAKAMIZAWA[1], Kenichi SUGAHARA[2], Takao SHINJI[3], Akihiko YOKOYAMA[4]
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Challenges for the Colombian Electricity Market during COVID-19

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Keywords: RPI-X

Transmission Regulation: The Economic Regulation Applied for Oman Electricity Transmission Network

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Keywords: carbon pricing, wholesale electricity markets, greenhouse gases, emissions trading system, carbon tax

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Anthony GIACOMONI[1], Diego ALVARADO[2], Livia AMORIM[3], Kenneth BRUNINX[4], Brian JOSEPH[5], Anes KAZAGIC[6], Rodrigo MORENO[7], Subhendu MUKHERJEE[8], Yoann THOMAS[9], Jarrad WRIGHT[10]
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Keywords: wholesale electricity market structure, price formation, capacity, accreditation, intermittent energy sources, distributed energy resources

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[1]JSC "Administrator of the wholesale Electricity market trading system"; [2]PJSC "Rosseti Center"

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Deployment and Evaluation of TSO-DSO-Consumer Coordination in a Market Environment

Nikolaos SAVVOPOULOS[1], Dimitris TRAKAS[1], Aris DIMEAS[1], Nikos HATZIARGYRIOU[1], Emmanouil VOUMVOULAKIS[2], Eirini LEONIDAKI[2], Markos CHAMPAKIS[2]
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Implementation of a wholesale electricity market based on bilevel programming algorithm in Cyprus

Amritbir Singh GILL[1], Wan-Ying HUAN[1], Sami AMMARI[1], Ioannis YIANNAKI[2], Nikos KANELAKIS[2], Konstantina MENTESIDI[2], Konstantinos PERRAKIS[2]
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Development of Guarantees of Origin trading in Croatia within the European context

Marko KELAVA
HRO CIGRE, Croatia

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Topics: PS3 - Working With Innovation and Disruption — Preparing For the Future
Keywords: Value-at-Risk (VaR), Conditional Value-at-Risk (CVaR), Historical Simulation method, Variance–covariance method, Monte Carlo method, Ancillary Service, Balancing Market, Portfolio Optimization

Risk Evaluation for Ancillary Service

Omer HADZIC[1], Adnan MUJEZINOVIC[2], Zijad BAJRAMOVIC[2], Irfan TURKOVIC[2]
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Spanish Technical Standard (NTS) for grid connection of generation

Sergio MARTÍNEZ-VILLANUEVA[1], Daniel DAVÍ-ARDERIUS[2], José Luis BORREGO-NADAL[3]
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Evaluation of critical peak pricing impact on Hydro-Quebec residential customers load profile for distribution network planning

Atieh DELAVARI*, Simon SANSREGRET
Hydro-Quebec Research Institute, Canada

C6 - ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES

PS 1 DER SOLUTIONS AND EXPERIENCES FOR ENERGY TRANSITION AND DECARBONISATION

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Topics: PS1 - DER Solutions and Experiences for Energy Transition and Decarbonisation
Keywords: Conservation Voltage Reduction, Energy saving, Hardware in the Loop

Control Strategy of Conservation Voltage Reduction for Energy Saving in Low Voltage Distributed Network

Saehwan LIM, Hyeong-Jun YOO, Gyeong-Hun KIM, Jihui HWANG, Jin-Oh LEE
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Topics: PS1 - DER Solutions and Experiences for Energy Transition and Decarbonisation
Keywords: high speed, railway, power supply, power electronics, case studies

Improvement of high speed railway power supply utilizing power electronic solutions - case studies

Philippe MAIBACH
Hitachi Energy Switzerland

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Two Years of Operation of the S4S Tilos Hybrid Power Station, Experiences and Lessons Learned

Evaggelos TSOUMAS[1], George PECHLIVANOGLOU[1], Vasilis KALAVROUZIOTIS[1], Vasilis TSIMARAS[1], Antonis MOUSTAKIS[1], Konstantinos KAOUSIAS[2], Haris KOURELIS[2], Angeliki KOURI[1]
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Topics: PS1 - DER Solutions and Experiences for Energy Transition and Decarbonisation
Keywords: AHP model, PV technology, power generation, renewable, technologies

Sustainable Generation Expansion Planning (GEP) with renewables: A case study of Bahrain

Abdulla ALABBASI[2], Matthew LEACHA[1], Jhuma SADHUKHAN[1], Mohammed SANDUK[3]
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A study on the effect of electric vehicles' charging stochasticity on a machine learning-based fault detection algorithm

Paschalia STEFANIDOU-VOZIKI[1], Nikolaos SAPOUNTZOGLOU[2], Roberto VILLAFAFILA-ROBLES[3], Jose Luis DOMINGUEZ-GARCIA[1]
[1]IREC; [2]ENTSO-E; [3]UPC

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C6 ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES - Full Papers
Topics: PS1 - DER Solutions and Experiences for Energy Transition and Decarbonisation
Keywords: v2g, electric vehicles, daily charge curve, pyomo

V2g technology and its impact on the daily load diagram: case se0062 - huancayo – peru

Leonidas SAYAS POMA[1], Fidel MEDINA CATAY[2]
[1]OSINERGMIN; [2]Universidad Nacional del Centro del Peru

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Distributed Energy Resource Management System – Challenges and Opportunities

L LEITE[1], D ALVES[2], M NASCIMENTO[3], N TRIVED[4], B MARTINS[5]
[1]FITec, Brazil; [2]CEMIG, Brazil; [3]CONCERT, Brazil; [4]VRINDA, EUA; [5]SCHNEIDER, Brazil

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Topics: PS2 - Innovative Planning and Operation of Active Distribution Systems
Keywords: Overhead Line – Active Distribution System – Directional Power Flow

Directional power flow Monitoring in overhead line distribution Networks with high Penetrations of DER

Samuel C E JUPE[1], Ben O BREWIN[1], Sid R HODA[1], S PINKERTON-CLARK[2], Simon J HODGSON[3]
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A Power Hardware-in-the-Loop Infrastructure for DER Integration

Olivier TREMBLAY
Hydro-Québec

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Topics: PS2 - Innovative Planning and Operation of Active Distribution Systems
Keywords: Distribution Network Reconfiguration, Hosting Capacity, Non-wire alternatives, Advanced distribution management system

Demonstration of Distribution Network Reconfiguration for increasing Hosting Capacity of Renewable Energy considering Multiple Constraints

Sung-Min CHO[1], Hyeong-Jin LEE[1], Won-Wook JUNG[1], Chang-hoon SHIN[1], Ja-Yoon KOO[2]
[1]Korea Electric Power Corporation Research Institute, Republic of Korea; [2]Hanyang University, Republic of Korea

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Topics: PS2 - Innovative Planning and Operation of Active Distribution Systems
Keywords: Distribution systems, Renewable energy, Self-sufficiency, Variability mitigation, Flexibility

A Study on the Self-sufficient and Flexible Operation Strategies of Distribution System with High Levels of Renewable Energy

G. S. BYEON, H. C. JO, W. B. SON, K. H. CHO, J. Y. KIM, S. K. KIM
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Topics: PS2 - Innovative Planning and Operation of Active Distribution Systems
Keywords: DERMS, reverse power flow, load relief, high voltage, voltage fluctuations

Utilizing DERMS and Utility Owned Weather Stations for High DER Penetration on the Distribution System

Nicholas BURICA, Beata OKRUTA, Imran RAHMAN, Heng CHEN
Commonwealth Edison, United States of America

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Topics: PS2 - Innovative Planning and Operation of Active Distribution Systems
Keywords: Distributed Energy Resources (DER), Distributed Energy Resource Management System (DERMS), Advanced Distribution Management System (ADMS), evaluation testing, Virtual Power Plant (VPP)

EPRI's Digital Twin SPIDER Testbed and Benefits

Aditie GARG, Jithendar ANANDAN, Ahm JAKARIA, Rayhan MITHU, Ajit RENJIT
Electric Power Research Institute, United States of America

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Analytic and Heuristic Optimal Reactive Power Management with Shunt Capacitors in Distribution System of Southern Regional Grid of India

Arthi Sahaya RONES V
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Analysis and a Conceptual Framework of Short-Term Planning Operation of South American Active Distribution Systems

Mauricio SAMPER, Mauro JURADO, Rodolfo ROSÉS
Institute of Electric Energy (IEE) - UNSJ - CONICET

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Topics: PS2 - Innovative Planning and Operation of Active Distribution Systems
Keywords: Volt-VAR Optimization, Conservation Voltage Reduction (CVR), CVR Factor, Energy Efficiency, Demand Response

Volt-VAR Optimization and Benchmarking in a Pilot Project

Tanuj KHANDELWAL[1], Ahmed Y. SABER[1], Lo Chin KIM[2], Calvin Ku Shong CHING[2]
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C6 ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES - Full Papers
Topics: PS2 - Innovative Planning and Operation of Active Distribution Systems
Keywords: smart inverters, solar photovoltaics (PV), distribution system modelling, voltage regulation

Smart Inverter Functions to Increase PV Hosting Capacity - A Case Study of New York Distribution Circuits

Jouni PEPPANEN, Shammya SAHA, Devin VAN ZANDT, Matt RYLANDER
Electric Power Research Institute, United States of America

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C6 ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES - Full Papers
Topics: PS2 - Innovative Planning and Operation of Active Distribution Systems
Keywords: Distributed Energy Resources (DER), distribution system modelling, energy storage (ES), smart inverters, solar photovoltaics (PV)

Distributed Energy Resource Benchmark Models for Distribution Impact Assessment Developed by CIGRE Working Group C6.36

Jouni PEPPANEN[1], Jason TAYLOR[1], Daniel FONSECA[2], Josh SNODGRASS[3], Shengen CHEN[4]
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C6 ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES - Full Papers
Topics: PS2 - Innovative Planning and Operation of Active Distribution Systems
Keywords: Distribution System, Distributed Energy Resource, Voltage Control, Reactive Power

Development of Voltage and Power Flow Control Method for Distribution System Using Distributed Energy Resources

Satoshi UEMURA[1], Hiroyuki HATTA[1], Yasuhiro HAYASHI[2], Atsushi ISHIGAME[3], Jun YOSHINAGA[4], Kenjiro MORI[5]
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C6 ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES - Full Papers
Topics: PS2 - Innovative Planning and Operation of Active Distribution Systems
Keywords: Off-grid - Inverter power supply - Power conditioner system - PV - BESS - Fault detection - Black start - Soft-start

Economical and Technical Evaluation of Transformation from Existing Distribution System to Off-grid

Masato SHIRO[1], Tetsuya HIRAYAMA[1], Hideyasu HOKAZONO[1], Kazuyoshi HASHIKAWA[1], Tomonosuke MORI[2], Junichi KUMANO[2]
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C6 ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES - Full Papers
Topics: PS2 - Innovative Planning and Operation of Active Distribution Systems
Keywords: Connect and Manage, Non-firm Connection, Cost Comparison Study, Grid Reinforcement

Examination of NF-type Connection Power Supply for Interconnection to the Power Distribution System

Jun YOSHINAGA[1], Kazunari ISHIBASHI[1], Kazuki TAKAHASHI[1], Nozomi ANDO[2], Hiroaki OTAKE[2], Hiroshi IRIE[2]
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C6 ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES - Full Papers
Topics: PS2 - Innovative Planning and Operation of Active Distribution Systems
Keywords: Transmission systems, Distribution systems, Demand-side control, DERMS, Optimal Power Flow, Voltage and Current Control

Voltage and Current Control of Transmission and Distribution Systems Utilizing Demand-side DERs

Shunsuke KAWANO, Keisuke YAMANE, Keishi MATSUDA
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A method for Accurate Balanced Radial Distribution System Parameters Estimation

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Congestion Management in Distribution Systems with Large Presence of Renewable Energy Sources

Martin LUNDBERG[1], Olof SAMUELSSON[1], Markus MIRZ[2], Emil HILLBERG[3], Niel HANCOCK[4]
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Power quality issues due to PV integration in distribution systems – Two Swedish case studies

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Analysis Of The Effect Of Solar Power Plants On Technical Losses In The Grid; Case Study: Kahramanmaras Region in Turkey

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Topics: PS2 - Innovative Planning and Operation of Active Distribution Systems
Keywords: Control in A.C Microgrids: Hierarchical Control, Technologies and Regulations

Control in AC Microgrids: Hierarchical Control, Technologies and Regulations

Jose RAMIREZ
Universidad del Valle

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Active Network Management (ANM) Experiences in i-DE Networks

Cristina VILA CASTRO
i-DE Redes Eléctricas Inteligentes SAU

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ZellNetz2050 - A Concept for the Efficient and Effective Operation of Multi-Sector Cellular Energy Systems

Felix FLATTER[1], Sara MOHAMMADI[2]
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Scenarios and field trials on active distribution grids in the German Kopernikus projects SynErgie and ENSURE

Peter NOGLIK[1], Tobias PLETZER[2]
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Determination of Real-Time Interdependent Flexibility on multiple Grid Connection Points in an Active Distribution Network

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Devising Models for the Integration of DER in Designated Zones in South Africa

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Technological Interventions to maximise Benefits in Electrification Programme

MH XIVAMBU
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Behind-the-Meter PV Estimation for Grid Awareness and Enhanced Visibility

Aditie GARG
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PS 3 AGGREGATED DER FOR ENHANCING RESILIENCE, RELIABILITY AND ENERGY SECURITY OF DISTRIBUTION SYSTEMS

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C6 ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES - Full Papers
Topics: PS3 - Aggregated DER for Enhancing Resilience, Reliability and Energy Security of Distribution Systems
Keywords: microgrid, Vehicle to Grid (V2G), reliability, resiliency, Battery Energy Storage System (BESS)

A Microgrid Platform for V2G: Lessons Learned from the Arlington Microgrid

John GLASSMIRE[1], Scott GIBSON[2], Ryan M. SMITH[1], Chanaka KEERTHISINGHE[3]
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Topics: PS3 - Aggregated DER for Enhancing Resilience, Reliability and Energy Security of Distribution Systems
Keywords: Battery Energy Storage Systems (BESS), Community Energy Storage Systems (CES), resiliency, reliability, peak shaving

Utility Energy Storage Use Cases, Health Monitoring, Data Analysis and Learnings (BESS)

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Topics: PS3 - Aggregated DER for Enhancing Resilience, Reliability and Energy Security of Distribution Systems
Keywords: BESS, Flexibility, Islanded Systems, Laboratorial Testing

Laboratorial testing of island integration of BESS at 5% scale

Carolina JESUS[1], Luís Miguel ROCHA[2], Pedro REIS[2], Pedro RIBEIRO[2], Rui MARTINS[2], Andreia LEIRIA[2], Isabel CATARINO[1]
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Topics: PS3 - Aggregated DER for Enhancing Resilience, Reliability and Energy Security of Distribution Systems
Keywords: VPP(Virtual Power Plant), DER(Distributed Energy Resources), DSO(Distribution System Operator), Cloud, Management

Demonstration of Cloud Based Management and Control System for Virtual Power System in Korea

Seowoo LEE, Jinho LEE, Beomryeol CHOI, Hyeonjeong JO, Bogun JIN
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A Method for Planning and Assessment of LVDC System in Civil Buildings

Guowei LIU[1], Yuming ZHAO[1], Yangxin QIU[2], Longjun WANG[2], Lili MO[2], Qing ZHONG[2]
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Topics: PS3 - Aggregated DER for Enhancing Resilience, Reliability and Energy Security of Distribution Systems
Keywords: microgrid, Solar PV and Battery Coordination (SBC), Distributed Energy Resources (DER), Hardware in the Loop (HIL)

Coordinated Solar PV-BESS Control in BCM: Algorithm, HIL Testing and Learnings with Different Solar Profiles

Niroj GURUNG, Roshan SHARMA, Honghao ZHENG, Aleksandar VUKOJEVIC
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Research on Operation Control Strategy of Low-voltage DC Microgrid Based on Improved Droop Method

Xiangbiao LENG[1], Kang CHEN[2], Fei PENG[1], Haixiang YU[1], Junxin NIU[1], Wenlong ZENG[1], Qiaozhang HONG[1]
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Case Study for Greening Island in Andaman

Dhirendra JOSHI[1], Subir KARMAKAR[2]
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Topics: PS3 - Aggregated DER for Enhancing Resilience, Reliability and Energy Security of Distribution Systems
Keywords: Operation Method, Protection Devices, MVDC, Microgrid System, Distributed Generators

Operation Method of Protection Devices in 5kV MVDC Microgrid System Interconnected with Distributed Generators

Daeseok RHO[1], Byungki KIM[2], Hosung JIN[3]
[1]Korea University of Technology & Education; [2]Korea Research of Energy Research; [3]Gana Engineering Institute

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Transient Operation Algorithm of CVCF Inverter-based Micro-grid System

Byungki KIM[1], Daeseok RHO[2], Hudong LEE[2], Donghyun TAE[2]
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A Hybrid Heuristic Optimization Algorithm for the Rolling Day-Ahead Scheduling of Non-Interconnected Islands in Greece

Charalampos PAPPAS, Despina KOUKOULA, Stefanos KOKKINELIS, Argiro MAGANIOTI, Andreas REPPAS, Theodora PATSAKA
HEDNO, Greece

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A Testbed-based Approach for the Resiliency Assessment of Multi-Microgrids

Michael SPIEGEL, Thomas STRASSER
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Enhancing grid resilience and flexibility with sustainable data centers

Sten TROLLE[1], Karla LAINEZ AMAYA[1], Marcus GIESE[2], Mats LARSSON[3], Alexandre OUDALOV[3], Sebastian ORRAS APARICIO[3]
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A Research on Power Quality of Storage System in Photovoltaic Energy Generation Systems in Distribution Networks

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Economic Analysis of Stand Alone and Grid Connected Microgrid by Using HOMER

Mikail PURLU[1], Belgin Emre TURKAY[2], Sezen BEYARSLAN[3]
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Experimental comparative analysis of photovoltaic inverters profiles in relation to the European network code NC RfG, the technical standards and the requirements of distribution system operators

Zbigniew HANZELKA, Krzysztof CHMIELOWIEC, Łukasz TOPOLSKI, Aleks PISZCZEK, Mateusz DUTKA
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Evaluation and selection of key monitoring variables for estimating operational limits of the BESS in the grid connection through modelling approach

Juan GILABERT-MARZAL[1], Isabel FERRER-GALIANA[1], Alejandro BELINCHON-CALDERÓN[1], Victoria JOVER-MEGÍA[1], Alfredo QUIJANO-LÓPEZ[2]
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C6 ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES - Full Papers
Topics: PS3 - Aggregated DER for Enhancing Resilience, Reliability and Energy Security of Distribution Systems
Keywords: Hybrid RES, mini-grid, rural electrification, energy storage, mini-grid control

Renewable Energy Hybrid Mini-Grid Concept for Rural Electrification in Georgia

Giorgi ARZIANI, Teona ELIZARASHVILI, Baia KVATADZE
Parvus Consulting, Georgia

D1 - MATERIALS AND EMERGING TEST TECHNIQUES

PS 1 TESTING, MONITORING AND DIAGNOSTICS

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics

Experience with Electrical Tests in UHVDC System for Safety Quantities Definition for Live Line Working

J CARDOSO[1], R GARCIA[1], F SILVA[1], A NIGRI[2], J GRAHAM[3], R COSTA[3], F ZUO[3]
[1]CEPEL; [2]Independent Consultant; [3]SGBH

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics

Integrity Evaluation of Thermal Power Plant based on Carbide Precipitation Sequence

H FURTADO, T SANTOS, R SANTANA, B CARDOSO, L ALMEIDA
CEPEL, UFRJ

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics

Methodologies Development for Power Transformers Incipient Faults Prediction Related to Particles Contamination and Bubble Formation

H WILHELM[1], P FERNANDES[1], L DILL[1], K MOSCON[1], C STEFFENS[1], S PERES[1], V BENDER[2], T MARCHESAN[2], J NETO[3]
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ID: 10229
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics
Keywords: H2 Gas-Led, Stray, Catalytic and Chemical Reaction

The Analysis for the Diagnosis Method about H2 Gas-Led Issue according to Stray, Catalytic and Chemical Reaction for transformers in Service

J.K LEE, K.H LEE, D.H KIM
HYUNDAI ELECTRIC & ENERGY SYSTEMS CO., LTD., Korea, Republic of (South Korea)

ID: 10397
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics
Keywords: machine learning, Duval pentagons, DGA, classification

Machine Learning Algorithm Trained by the Duval Pentagons - A Simplified DGA Approach

Luiz CHEIM
Hitachi Energy, United States of America

ID: 10398
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics
Keywords: high voltage bushing, dielectric frequency response, insulation assessment, temperature, leakage current

Effective Insulation Condition Assessment of HV and EHV Bushings under Critical Environmental and Operational Conditions

Diego ROBALINO[1], Peter WERELIUS[2], Ismail GUNER[3]
[1]Megger Group, United States of America; [2]Megger, Sweden; [3]Hydro Quebec, Canada

ID: 10399
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics
Keywords: accuracy, low-power instrument transformer, capacitive voltage dividers, ratio error, phase error

Aging Assessment of High Accuracy Low Power Voltage Transformer

Mattewos TEFFERI[1], Elisa SCALA[2], Andrea NALLI[2], Nick NAKAMURA[1], Blair KERR[1], Laura MAZZOCCHETTI[3], Lorenzo PERETTO[3], Nenad UZELAC[1]
[1]G&W Electric, United States of America; [2]G&W Altea, Italy; [3]University of Bologna, Italy

ID: 10606
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics

Research on the Causes of Damage to High-Voltage Oil-Filled Equipment with a "Gas Blanket"

L.A. DARIAN[1], S.M. KOROBEYNIKOV[2], V.A. LOGUNOV[3], R.M. OBRAZTSOV[1]
[1]JSC "Technical Inspection UES"; [2]Novosibirsk State Technical University (NSTU); [3]Federal State Unitary Enterprise «Russian Federal Nuclear Center – Zababakhin All– Russia Research Institute of technical Physics»

ID: 10610
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics

The Application of Artificial Neural Networks in the Diagnosis of High-Voltage Circuit Breaker

A.R. ROTBLYUT, D.A. PALFEROV, O.P. BUKRIN
OOO Elmash (UETM)

ID: 10646
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics
Keywords: Aging management, nondestructive testing, underfilm corrosion, terahertz waves, millimeter waves, transmission towers

Nondestructive Terahertz and Millimeter Wave Imaging for Underfilm Corrosion

Norikazu FUSE[1], Yasuhiko HORI[1], Tsuguhiro TAKAHASHI[1], Maya MIZUNO[2]
[1]Central Research Institute of Electric Power Industry; [2]National Institute of Information and Communications Technology

ID: 10647
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics
Keywords: Power transformer, Cellulose fiber, Static electrification phenomenon, Insulation paper, Degree of polymerization, ECT

The Evaluation Method of Static Electrification in Aged Power Transformers Using Cellulose Fibers Suspended in Insulating Oil

Masanobu YOSHIDA[1], Hiroko ISAJI[1], Gaku SATO[2], Yoshinori KONISHI[2], Takayuki GOTOH[2]
[1]Chubu Electric Power Co., Inc.; [2]YUKA Industries. Co., Ltd.

ID: 10684
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics
Keywords: HVDC, GIS, voltage dividers, diagnostic, testing

Diagnostic and testing on GIS voltage dividers for HVDC applications

Uwe RIECHERT[1], Erik SPERLING[2], Andreas DOWBYSCH[3]
[1]Hitachi Energy Switzerland; [2]Omicron electronics GmbH Switzerland; [3]TU Dresden Germany

ID: 10830
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics

On-load tap changer monitoring and protection by extra power loss and circulating current analysis

Nilanga ABEYWICKRAMA, Tord BENGTSSON
Hitachi Energy Research, Sweden

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics

On-load tap changer switching sequence monitoring – comparison of methods

Joachim SCHIESSLING[1], Cecilia FORSSÉN[1], Nilanga ABEYWICKRAMA[1], Niklas GUSTAVSSON[2], L LIDÉN[2], B-O STENESTAM[2], T LARSSON[2]
[1]Hitachi Energy Research Sweden, Sweden; [2]Hitachi Energy Sweden, Sweden

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics

Requirements for Ultra High Frequency Partial Discharge Monitoring Systems for Gas Insulated Systems

Wojciech KOLTUNOWICZ, Glenn BEHRMANN, Matthias BOLZE, Andrea CAPRARA, Graeme COAPES, Fraser COOK, Hiroyuki HAMA, Thomas HUECKER, Carl JOHNSTONE, Stefan NEUHOLD, Claus NEUMANN, S. OHTSUKA, Jean-Francois PENNING, Uwe RIECHERT, Toshiaki ROKUNOHE, Uwe SCHICHLER, Markus SOELLER, Takanori YASOUKA
CIGRE Working Group D1.66

ID: 10951
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics
Keywords: Dissolved Gas Analysis, DGA, Diagnostics, Condition Monitoring

Determination of Gas Solubility Coefficients for Dissolved Gas Analysis (DGA)

Senja LEIVO, Mikko ARONNIEMI, Sami VIRTANEN, Jarkko LARKIO, Toni MELLIN, Lydia HYRSKY, Sutidara NOPAKUN-BOROVSKA
Vaisala

ID: 11049
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics

Requirements for Artificial Intelligence Platform addressed to Automatic Assessment of Insulation Condition of Indoor and Outdoor Installations through Partial Discharge Monitoring

Antonio SÁNCHEZ[1], Fernando GARNACHO[3], Javier ORTEGO[4], Fco. Javier MARTÍN[2], Ricardo REINOSO[1], Ricardo GÓMEZ[1], Alejandro VIVAS[1], Ángel RAMÍREZ[3], Abderrahim KHAMLICHI[3], Carlos VERA[3], Javier DI DECO[5], Sergio GONZÁLEZ[5], Alejandro MUNICIO[5], Edmundo SANTOLARIA[5]
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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics

Optimized deployment of online partial discharge monitoring solutions for distribution grids

Antonio GONZÁLEZ[1], Javier ORTEGO[2,4], Fernando GARNACHO[3,4]
[1]EDP REDES ESPAÑA; [2]AMPACIMON; [3]LCOE; [4]UPM

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics

Requirements, design principles and testing experience with composite voltages on a ±550 kV HVDC GIS voltage divider

Maria KOSSE[1], Erik SPERLING[2]
[1]Siemens Energy Global GmbH & CO. KG, Germany; [2]Omicron Electronics GmbH, Switzerland

ID: 11112
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics

Novel Fiber Optic Sensor Technology for Determining the DP Value of Insulating Paper for Transformers

Tobias MUENSTER[1], Peter WERLE[2]
[1]Leibniz Universität Hannover, Germany; [2]Leibniz Universität Hannover, Germany

ID: 11115
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics

Contribution to the standardisation of measurement of composite and combined high voltages

Ernst GOCKENBACH
Gottfried Wilhelm Leibniz Universität Hannover

ID: 11116
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS1 - Testing, Monitoring and Diagnostics

Impact of Different Blocking Elements on the DC-Impulse Composite Waveform

Andreas DOWBYSCH[1], Thomas GÖTZ[2]
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ID: 10129
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes
Keywords: sulfur hexafluoride, insulation, dielectric medium, fluoronitrile, diffusion

Simulation of Diffusion Behavior for New Insulating Gases

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

Oxidation Susceptibility of Insulating Mineral Oil and Natural Ester at Different Oxygen Concentrations

P FERNANDES[1], H WILHELM[1], L DILL[1], K MOSCON[1], C STEFFENS[1], T ROCHA[2]
[1]Vegoor Tecnologia Aplicada, Brasil; [2]ENEL Distribuição São Paulo, Brasil

ID: 10180
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

Thermally Upgraded Kraft Paper Performance in Insulating System Using Natural Ester Tested According to IEEE STD C57.100

H WILHELM[1], P FERNANDES[1], L DILL[1], K MOSCON[1], C STEFFENS[1], R MAREK[2]
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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

Research on the application of the environmentally friendly insulating gas CF3I in Electric power apparatus

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ID: 10400
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes
Keywords: Aramid Pressboard, Aramid Paper, Cellulose Pressboard, Dielectric Strength, Creep Strength

Dielectric Performance of Aramid Pressboard in Insulating Liquid

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ID: 10404
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes
Keywords: high voltage, Crosslinked Polyethylene (XLPE), insulation, degassing

New Crosslinking Technologies for Polyethylene Insulated Power Cables

Paul CARONIA[1], Timothy PERSON[1], Jeffrey COGEN[1], Roshan AARONS[2], Caroline GRAND[3], Yabin SUN[4]
[1]Dow Chemical, United States of America; [2]Dow Chemical, Switzerland; [3]Dow Chemical, Spain; [4]Dow Chemical, China

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes
Keywords: HVDC, conductivity, XLPE, semicon, interface

Characterization of Extruded Material System for HVDC Cable Application

Timothy PERSON
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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

Ageing Study on Glass Fiber Composite Rod of Silicone Rubber Insulators

Nitin R SHINGNE
Electrical Research and Development Association (ERDA)

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Topics: PS2 - Materials for Electro Technical Purposes

Acceleration in corona induced degradation of polymeric insulator under low atmospheric pressure

Shakthi P DAS
Indian Institute of Technology, Goa

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Topics: PS2 - Materials for Electro Technical Purposes

Recommendations for IEC 60815-2 based on Functional Performance of Optimized HVCB Porcelain Insulators in Very Highly Polluted Environments

V BALAJI, R JEYAPRAGASH
GE T&D - India

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

Changing of the Insulating Characteristics of Mixtures (Mineral Oil and Synthetic Ester) During Prolonged Exposure of Elevated Temperature

M. LYUTIKOVA[1], A. KONOVALOV[2], S. KOROBEYNIKOV[3]
[1]Federal Grid Company of Unified Energy System; [2]Rosseti; [3]Novosibirsk State Technical University

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

The Degradation Degree Control of the Hydrocarbon Base of Mineral Oils Using the Specific Degradation Marker in their Infrared Spectrum

M.Sh. GARIFULLIN[1], Yu.N. SLOBODINA[1], A.R. BIKZINUROV[1], R.A. GINATULLIN[2]
[1]Kazan State Power Engineering University; [2]Kazan National Research Technological University

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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

Universal Method for Assessing Oil-Filled Equipment Based on the Results of DGA

I. DAVIDENKO[1], K. OVCHINNIKOV[2], M. VLADIMIROVA[3]
[1]Ural Federal University; [2]quot;Energo-Diagnostics and Analytics" LLC; [3]quot;Massa LLC"

ID: 10648
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes
Keywords: gas insulated switchgear, permittivity functional graded material (ε-FGM), nano-micro composite(NMC)

Development of Sophisticated Cone-Type Insulating Spacer for 245 kV Class GIS by Functional Insulating Materials

Kenji OKAMOTO[1], Naoki HAYAKAWA[2], Masayuki HIKITA[3], Hitoshi OKUBO[4], Katsumi KATO[5], Naoki OSAWA[6]
[1]Fuji Electric Co., Ltd.,; [2]Nagoya University; [3]Kyushu Institute of Technology; [4]Aichi Institute of Technology; [5]National Institute of Technology, Niihama College; [6]Kanazawa Institute of Technology

ID: 10649
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes
Keywords: Epoxy nanocomposite, Agglomerate, Electroluminescence, Breakdown, Insulation lifetime

Nanofiller Dispersion Effect on Insulation Performances of Epoxy Nanocomposite Material: Electroluminescence, Breakdown Strength and Electrical Insulation Lifetime

Takahiro UMEMOTO[1], Shigeyoshi YOSHIDA[1], Takahiro MABUCHI[1], Hirotaka MUTO[1], Muneaki KURIMOTO[2], Kazuyuki TOHYAMA[3]
[1]Mitsubishi Electric Corporation; [2]Nagoya University; [3]National Institute of Technology, Numazu College

ID: 10650
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes
Keywords: FGM - Nanocomposite - Gas -Insulation - Switchgear - Generator - Enamel - Epoxy

Joint R & D Project on the Development of Electric Power Equipment using new Functional Insulating Materials

Kazuo ADACHI[1], Hirotaka MUTO[2], Kenji OKAMOTO[3], Yoshikazu HOSHINA[4], Nobutaka FUJIMOTO[5]
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ID: 10685
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes
Keywords: residual quartz, lifetime, C-130, alumina porcelain, high voltage insulator

Impact of the residual quartz to the expected lifetime of C-130 alumina porcelain high voltage insulator

Markku RUOKANEN[1], M. VRABEC[1], A. TRNIK[2], O. AL-SHANTIR[2], D. MIKUSOVA[2]
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ID: 10828
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

Test methods and criteria for validation of functional properties of composite insulators related to materials and interfaces

Igor GUTMAN[1], Andreas DERNFALK[1], Johan LUNDENGÅRD[1], Peter SIDENVALL[1], Andre DECKWERTH[2], Luis DIAZ[3], Kjell HALSAN[4], Michael LEONHARDSBERGER[5], Milan RADOSAVLJEVIC[6], Philipp TRENTZ[7], Keijo VÄLIMAA[9], Kübranur VARLI[8]
[1]I2G, Sweden; [2]50Hertz, Germany; [3]RTE, France; [4]Statnett, Norway; [5]APG, Austria; [6]Svenska kraftnät, Sweden; [7]E.ON, Germany; [8]Amprion, Germany; [9]Fingrid, Finland

ID: 10829
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

Mechanical strength of pressboard materials under dynamic compressive stress

Orlando GIRLANDA[1], Sören ÖSTLUND[2], Peter HEINZIG[3], Lars Erik SCHMIDT[1], Radoslaw SZEWCZYK[4], Serkan MUMCU[5]
[1]HITACHI ENERGY, Sweden; [2]KTH ROYAL INSTITUTE OF TECHNOLOGY, Sweden; [3]WEIDMANN; [4]DU PONT; [5]ENPAY

ID: 10982
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

Differences in ageing pattern and production/consumption of ageing markers in kraft and thermally upgraded papers immersed in mineral and natural ester oil

Jelena LUKIC[1], Jelena RANKOVIC[1], Draginja MIHAJLOVIC[1], Lars Erik SCHMIDT[2], Mark JOVALEKIC[3]
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ID: 11027
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

Thermal faults simulation for aramid insulation in liquid immersed power transformers

Radosław SZEWCZYK[1], Roger C. WICKS[1], Leonardo GALHARDO[1], Helena M. WILHELM[2], Paulo O. FERNANDES[2], Lais P. DILL[2], Camila STEFFENS[2], Kethlyn G. MOSCON[2], Sergio M. PERES[2]
[1]DuPont; [2]Vegoor Tecnologia Aplicada

ID: 11048
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

Fingerprinting and testing methods of RTV silicone-coatings for glass insulators

Héctor DE SANTOS[1], Cristina HERRERO-PONCE[2], Pedro LLOVERA-SEGOVIA[2,3]
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ID: 11109
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

Compatibility of Transformer Materials with Insulating Liquids

Ivanka ATANASOVA-HÖHLEIN[1], Veronika HARAMIJA[2], Dijana VRSALJKO[2]
[1]Siemens Energy, Germany; [2]Koncar - Electrical Engineering Institute, Croatia

ID: 11113
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

Experimental investigations on electro-thermal ageing of EPDM for HVDC cable joints

Isabella NETT[1], Marvin BENDIG[2]
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ID: 11114
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

Investigations on the long-term performance of Fluoronitrile-containing gas mixtures in gas-insulated systems

Karsten JUHRE[1], Hansgeorg HAUPT[2]
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ID: 11160
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

The use of Niobium Pentoxide as a High-Performance Material for Applications in Energy Storage

Gustavo Henrique GOMES*
Universidade Federal de Minas Gerais, Brazil

ID: 11161
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS2 - Materials for Electro Technical Purposes

A test setup to find the relation between interfacial pressure and tangential breakdown voltage of epoxy/silicone rubber interface

Sanjay GANESHAN*[1], Armando RODRIGO MOR[1], Panagiotis TSAKONAS[2]
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PS3 SIMULATION TOOLS PARTENERED WITH MEASUREMENT TECHNIQUES

ID: 10181
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS3 - Simulation Tools Partnered With Measurement Techniques

Evaluation of the Electrical Performance of Insulation in High Voltage Equipment Under the Effects of Contaminants Usually Neglected on Ordinary Electric Field Calculations

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ID: 10269
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS3 - Simulation Tools Partnered With Measurement Techniques

Development and Implementation of Transformer Condition Monitoring Models for the Interpretation of Sensor and SCADA Data

Patrick PICHER
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ID: 10272
D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS3 - Simulation Tools Partnered With Measurement Techniques
Keywords: Infrared thermography, PV modelling, single-diode model, irradiance, temperature

Power generation by unhealthy photovoltaic modules

Rita RAIMUNDO[1], André COELHO[2], Rui MARTINS[2], Isabel CATARINO[1]
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D1 MATERIALS AND EMERGING TEST TECHNIQUES - Full Papers
Topics: PS3 - Simulation Tools Partnered With Measurement Techniques

Use of Multiphysics Simulation Tools for Building a Digital Twin of Power Transformers

Stefan TENBOHLEN[1], Chandra Prakash BEURA[2]
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Topics: PS3 - Simulation Tools Partnered With Measurement Techniques

The Use of Machine Learning and Artificial Neural Networks to Recognition of Turning Faults in Power Transformers

Aleksandr KULIKOV, Anton LOSKUTOV, Anna SOVINA
Nizhny Novgorod State Technical University n.a. R.E. Alekseev, Russian Federation

D2 - INFORMATION SYSTEMS & TELECOMMUNICATION

PS1: The opportunities and challenges brought by emerging Information and Communication Technologies to Electric Power Utilities in their path to Digital Transformation

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Application of Artificial Intelligence Tools for Optimized Maintenance Scheduling based on Asset Management Concepts

M ALVES[1], G GOMES[1], M PINTO[1], R FEHLBERG[1], C URAS[1], D ARAUJO[1], S GIROTO[1], G MOURA[1], A CAMPOS[2], R DIAS[2], F SILVA[2], I SIQUEIRA[3], R FLAUZINO[4]
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Topics: PS1 - The Opportunities and Challenges Brought By Emerging Information and Communication Technologies to Electric Power Utilities in Their Path to Digital Transformation
Keywords: IEC 61850, digital substations, artificial intelligence, circuit breaker, condition monitoring

Artificial Intelligence-based Circuit Breaker Monitoring in IEC 61850 Digital Substations

Alexander APOSTOLOV
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D2 INFORMATION SYSTEMS AND TELECOMUNICATION - Full Papers
Topics: PS1 - The Opportunities and Challenges Brought By Emerging Information and Communication Technologies to Electric Power Utilities in Their Path to Digital Transformation
Keywords: data analytics, artificial intelligence, machine learning

Building a National Infrastructure for Artificial Intelligence on the Grid

Sean MURPHY[1], Laurel DUNN[1], Mohini BARIYA[1], Kevin JONES[2], Theo LAUGHNER[3]
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Topics: PS1 - The Opportunities and Challenges Brought By Emerging Information and Communication Technologies to Electric Power Utilities in Their Path to Digital Transformation

An Intelligent Devices Management and Collaborative Computing Technology in Cyber Power Physical System

Pengtian GUO[1], Daoxing LI[1], Kang XU[2], Zhixiang JI[1], Xiaohui WANG[1], Qi LI[2]
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Asset Mapping & Vulnerability Assessment using GIS Tools-Powergrid Experiences

Pankaj MAHATA
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Digital Transformation of Indian Electricity Market through Implementation of National Open Access Registry (NOAR)

Subhendu MUKHERJEE
Power System Operation Corporation Limited

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Topics: PS1 - The Opportunities and Challenges Brought By Emerging Information and Communication Technologies to Electric Power Utilities in Their Path to Digital Transformation
Keywords: Information, Communication, Maintenance, Education, Mixed Reality, Meter, Deep Learning

The advanced Applications for Equipment Maintenance utilizing the latest Information and Communication Technologies of Japanese Electric Power Utilities

Hiroyukie HATTORI[1], Makoto KUBO[2]
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D2 INFORMATION SYSTEMS AND TELECOMUNICATION - Full Papers
Topics: PS1 - The Opportunities and Challenges Brought By Emerging Information and Communication Technologies to Electric Power Utilities in Their Path to Digital Transformation
Keywords: Underground-Cable, Partial-Discharge, Deep-Learning, Ensemble

A Study on Diagnosis and Pattern Analysis of Partial Discharge of Underground Transmission Cables Using Deep Learning Ensemble Model

Mijeong JUN, Jihoon LEE, Huisung YANG
KEPCO KDN, Korea, Republic of (South Korea)

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Employing the Digital Platform for Intelligent Control of Distributed Energy Resources

A. NEBERA[1], S. KOVALYOV[2], N. SHUBIN[1], V. PERELYGIN[1], K. PEREVALOV[1], A. ANDRIEVSKY[1], F. NEPSHA[1], M. KRASILNIKOV[1]
[1]INTELAB, LLC; [2]Institute of Control Sciences V.A. Trapeznikov Academy of Sciences

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Implementation of a Decision Support System for Unaccounted Electricity Consumption Detection Using Machine Learning Methods

D.A. AKIMOV[2], I.P. VOLTOV[1], O.V. TURKINA[1]
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Topics: PS1 - The Opportunities and Challenges Brought By Emerging Information and Communication Technologies to Electric Power Utilities in Their Path to Digital Transformation

Machine Learning Approach for Power Flow Control in Congested Grids with Large Share of Variable Energy Resources

E.A. TSYDENOV, A.V. PROKHOROV
National Research Tomsk Polytechnic University

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Application of Modern Time-Series Analytics Tools to Improve Peak Load Management and Planning the EPU Development

Pavel LITVINOV[1,2], Sergey NESTEROV[1,2]
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Power Grid Diagrams Import Automation as a Part of a Digital Twins Development Process

Anton A. NEBERA
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Topics: PS1 - The Opportunities and Challenges Brought By Emerging Information and Communication Technologies to Electric Power Utilities in Their Path to Digital Transformation

New Opportunities for High-Voltage Power Equipment Health Management Using Intelligent Cyber Physical Systems

A.I. KHALYASMAA[1,2], S.A. EROSHENKO[1,2], P.V. MATRENIN[2]
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Topics: PS1 - The Opportunities and Challenges Brought By Emerging Information and Communication Technologies to Electric Power Utilities in Their Path to Digital Transformation

Data Management and Analytics Platform for converged operational Data

Maja SAVINEK[1], Tadej SINKOVEC[2], Rok DOLINSEK[3], Miroslav PAVLESKI[4]
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Topics: PS1 - The Opportunities and Challenges Brought By Emerging Information and Communication Technologies to Electric Power Utilities in Their Path to Digital Transformation
Keywords: IPPs, CIM, IEC

A practical approach for enhancing stakeholder effectiveness through improved asset and grid information governance - Achieving digital utility status by 2024

Jayaprakash PONRAJ, Vinay SARDANA
Abu Dhabi Transmission and Despatch Company, United Arab Emirates

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Topics: PS1 - The Opportunities and Challenges Brought By Emerging Information and Communication Technologies to Electric Power Utilities in Their Path to Digital Transformation

Computing intelligent insights about health of station subsystems with data analysis and Lean IIoT

Sarala Mohan NAIDU
Hitachi Energy, Sweden

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D2 INFORMATION SYSTEMS AND TELECOMUNICATION - Full Papers
Topics: PS1 - The Opportunities and Challenges Brought By Emerging Information and Communication Technologies to Electric Power Utilities in Their Path to Digital Transformation
Keywords: Data Augmentation, Partial Discharge, Training Dataset

Data Augmentation for Classification of the Partial Discharge Pattern Considering Imbalance and Phase Uncertainty of the Training Dataset

G. HWANG, H. KWON, S. KOO
LS ELECTRIC, Korea, Republic of (South Korea)

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D2 INFORMATION SYSTEMS AND TELECOMUNICATION - Full Papers
Topics: PS1 - The Opportunities and Challenges Brought By Emerging Information and Communication Technologies to Electric Power Utilities in Their Path to Digital Transformation
Keywords: Compact Secondary Substation, CSS, Digitalization, Internet-of-Thing (IoT), Internet-of-Energy (IoE), Predictive Maintenance, Sensoring Technology, Brownfield, Greenfield, Data Analytics

Practical Approach to Brownfield compact secondary Substations using the Internet-of-Energy (IoE) for Data-Driven Maintenance and Asset Management

Sanna HÄSÄ[1], Iiris RAUHALAMMI[2], Shyam MUSUNURI[3], Bruno Jorge de Oliveira SOUSA[4], Martin Davidsen KIRKEGAARD[5], Tony MÄNTYPURO[2]
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Wind Energy Bidding Strategy and Optimization using Model-Based Deep Reinforcement Learning

Manassakan SANAYHA
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Field Circuit Breaker Inspection using Machine Learning and Data Analytics on Sound Recognition

Sethachai DARNSOMBOON, Walanchaporn BOON-NONTAE
TNC-CIGRE, Thailand

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DAS Technology: an opportunity to use fibre optics for asset monitoring and security applications in Electric Power Utilities

Sacha KWIK[1], José María ABAD[1], Rubén MARTÍNEZ[2], Javier PRECIADO[2], Pascual SEVILLANO[3], Jesús SUBÍAS[3]
[1]Red Eléctrica de España; [2]Aragón Photonics Labs; [3]Universidad de Zaragoza (Grupo Tecnologías Fotónicas)

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Optimized decision making for asset management by using advanced fuzzy logic

Stefan WIETZKE[1], Andreas KUBIS[2]
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5G and the Power System Applications Requirements

Joyce Meireles SIQUEIRA*
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PS2: CYBERSECURITY TECHNIQUES, TECHNOLOGIES AND APPLICATIONS FOR SECURING CRITICAL UTILITY ASSETS

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D2 INFORMATION SYSTEMS AND TELECOMUNICATION - Full Papers
Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets

A Practical Approach on Cybersecurity Measures for Brazilian Utilities

P ANTUNES[1], A TEMPORAL[2], J HELUANY[1], M BRANQUINHO[3], P SILAS[4]
[1]SIEMENS; [2]CHESF; [3]TI SAFE; [4]SIDI

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Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets

Cyber Security Regulatory Impact Analysis in Brazilian Electric Power System – a Proposal of Regulatory Procedure

B MAZETO, T PINHEIRO, S SILVA, L QUEIROZ, M PINHEIRO, V OLIVEIRA, T COSTA, R AFONSO, S NETO
ANEEL (Brazilian Electricity Regulatory Agency)

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Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets

Secure Access and Device Management (SADM) System Implementation by Duke Energy

Ameen HAMDON
SUBNET Solutions

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Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets

A Blueprint for Cyber Security of Brownfield Substations in Power Systems using IEC 62443

Vetrivel RAJKUMAR[1], Shyam MUSUNURI[2], Alexandru STEFANOV[1], Siem BRUIJNS[3], Johan DE WIT[4], Danny KLAAR[3], Amadou LOUH[5], Arnaud THOEN[5], Peter PALENSKY[1]
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D2 INFORMATION SYSTEMS AND TELECOMUNICATION - Full Papers
Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets
Keywords: IEC 61850, cyber security, GOOSE, transmission line protection

Cybersecurity Challenges in IEC 61850-based Transmission Line Protection Systems

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ID: 10414
D2 INFORMATION SYSTEMS AND TELECOMUNICATION - Full Papers
Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets
Keywords: Peer to Peer energy sharing, transactive energy, energy storage, hierarchical control, optimization

Securely Implementing and Managing Neighborhood Solar with Storage and Peer-to-Peer Transactive Energy

Steven KNUDSEN[1], Subir MAJUMDER[2], Anurag K. SRIVASTAVA[2]
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D2 INFORMATION SYSTEMS AND TELECOMUNICATION - Full Papers
Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets

Cybersecurity Master Plan for Chilean Electricity Sector (2021 – 2023)

Eduardo MORALES[1], Jerson REYES[2], Fernando MUNOZ[3], Alvaro ACORIA[4]
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Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets

AI based security mechanism to false data injection attack- Case study of Northern Region Indian Grid

S Naresh RAM
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Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets

A Method in Evaluating the Effectiveness of Substation Firewalls and A Substation Perimeter Architecture in Connecting Third Party Generators to a Transmission Substation

Victor TAN[1], Brendan GRAHAM[2], Paolo TUAZON[2]
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D2 INFORMATION SYSTEMS AND TELECOMUNICATION - Full Papers
Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets

Development of a Method for Using Artificial Intelligence Systems for Assessing Cybersecurity Threats to Objects of a Digital Electrical Network

Vladimir KARANTAEV, Vladislav KARPENKO
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ID: 10713
D2 INFORMATION SYSTEMS AND TELECOMUNICATION - Full Papers
Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets
Keywords: Cybersecurity, Cyber Risk Assessment, Digital Engineering, Digital Twin

Role of Digital Engineering and Digital Twin Technology in Cybersecurity of Electrical Grid

Djenana CAMPARA[1], Andrea HRUSTEMOVIC[2], Adnan AHMETHODZIC[2], Nikolai MANSOUROV[3], Meludin VELEDAR[1]
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D2 INFORMATION SYSTEMS AND TELECOMUNICATION - Full Papers
Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets
Keywords: Cybersecurity Posture, Standard Compliance, Cybersecurity Assessment, Scalability Indexes

How to assess the cybersecurity posture of utility infrastructures? A case study from the OSMOSE project

Giovanna DONDOSSOLA[1], Roberta TERRUGGIA[1], Andrea FOSCHINI[2], Luca ORRU'[2], Giuseppe LISCIADRELLO[2], Francesco SILLETTI[2]
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Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets

Identified challenges and opportunities with Cyber Security standard compliance in combination with a long-expected lifetime

Johan MALMSTRÖM, Daniel HALLMANS, Jeremy MORGAN
Hitachi Energy, Sweden

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Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets

Analysis of the impact of cryptography in the GOOSE communications

Miguel Ángel SÁNCHEZ[1], Gerard VIDAL[2]
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Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets

Cybersecurity approaches for OT Critical Infrastructures

Dan BORDEA
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D2 INFORMATION SYSTEMS AND TELECOMUNICATION - Full Papers
Topics: PS2 - Cybersecurity Techniques, Technologies and Applications for Securing Critical Utility Assets
Keywords: SAS, SNMP, MMS, GOOSE, Zero-trust

A Substation-focused NMS for visualizing IEC 61850 Communication Networks

Kate HUANG, King WU, Sever SUDAKOV
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Topics: PS3 - Meeting the Demands of the Modern Utility and DER with an Agile and Resilient Telecommunication Network

Reflections on the Potential use of 5G Technologies in the Electric Sector

A PINHEL
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Topics: PS3 - Meeting the Demands of the Modern Utility and DER with an Agile and Resilient Telecommunication Network
Keywords: LPWA, Private LTE, Software LTE System, Wireless communication, Radio wave propagation, Power plant, Substation

The latest Wireless Communication Technology Initiatives from Japanese Electric Power Utilities

Hiroaki TSUCHIYA[1], Hiroyuki KAI[2], Ryousuke UMEZAWA[3], Yuki IWATA[4]
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Topics: PS3 - Meeting the Demands of the Modern Utility and DER with an Agile and Resilient Telecommunication Network

Seamless extension of fibre optical IP/MPLS network with 5G technology Releases allowing Business service segregation, Precision time synchronization and Critical teleprotection services in Utility distribution networks

Amadouh LOUH[1], Shuang ZHANG[2], Andrej GOERBING[3], Joey GODEFROOI[1], Andreas JAHR[3]
[1]Stedin NV; [2]Huawei Technologies; [3]Siemens AG

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Teleprotection signal testing over IP/MPLS network

Megha SHAHI, Paolo TUAZON, Mark SINCLAIR, Sameep GHARTI CHHETRI
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Topics: PS3 - Meeting the Demands of the Modern Utility and DER with an Agile and Resilient Telecommunication Network

Automation of Distribution Networks Using Cellular Communication Technologies

A. RODIONOV[1], A. POPOV[1], D. ULYANOV[1], S. PISKUNOV[1], A. MOKEEV[2]
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D2 INFORMATION SYSTEMS AND TELECOMUNICATION - Full Papers
Topics: PS3 - Meeting the Demands of the Modern Utility and DER with an Agile and Resilient Telecommunication Network
Keywords: IEC 61850, time information, WAN

Increasing the availability of modern digital grid applications by offering accurate time of day information as a service of the operational telecommunication network

Ramon BAECHLI[1], Marko BORISAVLJEVIC[1], Adolf FREI[1], Stefan MATTMANN[2], Yann GOSTELI[2]
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Topics: PS3 - Meeting the Demands of the Modern Utility and DER with an Agile and Resilient Telecommunication Network

Experimental evaluation of Teleprotection services over packet-based Networks

Soodesh BULJORE[1], F FONTENELLE[1], L ESTELRICH[1], P ALEMAN[1], M ACACIA[2]
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Topics: PS3 - Meeting the Demands of the Modern Utility and DER with an Agile and Resilient Telecommunication Network

Electric Power Industry of Serbia IP MPLS network upgrade: Providing operational and corporate services

Danilo LALOVIĆ, Vesna VUKIĆEVIĆ, Ivan VUKADINOVIĆ, Vigor STANIŠIĆ, Miodrag JEVTIĆ, Dalibor MITIĆ
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Topics: PS3 - Meeting the Demands of the Modern Utility and DER with an Agile and Resilient Telecommunication Network

Leveraging SD-WAN For Improving Availability of EGAT's Communication Network

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Topics: PS3 - Meeting the Demands of the Modern Utility and DER with an Agile and Resilient Telecommunication Network

Design of a daring IP Network Architecture in REE for the unavoidable convergence of services

Juan Ramón FEIJOO MARTÍNEZ, José María DELGADO ÁLVAREZ, Julio ESTÉVEZ, Bruno PERALTA VICENTE
Red Eléctrica de España