

2020 IEEE PES Transmission & Distribution Conference and Exhibition – Latin America (T&D LA 2020)

**Montevideo, Uruguay
28 September – 2 October 2020**



**IEEE Catalog Number: CFP20TLA-POD
ISBN: 978-1-7281-4156-5**

**Copyright © 2020 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP20TLA-POD
ISBN (Print-On-Demand):	978-1-7281-4156-5
ISBN (Online):	978-1-7281-4155-8
ISSN:	2381-3571

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

Program

2020 IEEE PES Transmission & Distribution Conference and Exhibition - Latin America (T&D LA)

DEMAND RESPONSE

<i>Optimal Demand Side Management for the Sparse Scheduling of Smart Charge of EVs</i>	
Sebastián Montes de Oca (Universidad de la República del Uruguay, Uruguay), Pablo Belzarena (Universidad de la República, Uruguay), Pablo Monzón (Universidad de la República, Uruguay)	1
<i>Forecasting Hourly Electricity Demand of Uruguay for the Next Day Using Artificial Neural Networks</i>	
Rodrigo German Porteiro (UTE, Uruguay, Uruguay), Sergio Nesmachnow (Universidad de la República, Uruguay)	7
<i>Design of Demand Response Programs: Customer Preferences Experiences in Colombia</i>	
Juan D. Molina (Colombia Inteligente, Colombia), Luisa F. Buitrago (Colombia Inteligente, Colombia), Jaime Zapata (XM esp, Colombia)	13

Distributed Resources

<i>Recloser - Fuse Coordination on Rural Feeders Having Distributed Generation by Using Specific Energy</i>	
Sebastian Nesci (Universidad Nacional de Río Cuarto & Instituto de Protecciones de Sistemas Eléctricos de Potencia, Argentina), Juan Carlos Gomez (U.N. de Rio Cuarto, Argentina), Leonardo Sanchez (Universidad Nacional de Río Cuarto, Argentina), Hernan Rovere (Universidad Nacional de Río Cuarto, Argentina)	19
<i>Probabilistic Analysis Based on Steady-state Voltage Level Compliance Indicators for LV Distribution Networks with High PV and EV Penetration</i>	
Luiz Eduardo Sales e Silva (Federal University of Pará, Brazil), João Paulo Vieira (UFPA, Brazil), Camila Alves (Federal University of Pará, Brazil), Andrey Lopes (Federal University of Pará, Brazil)	25
<i>Stochastic Analysis of Hosting Capacity in Low-Voltage Networks with PV-plus-Storage Systems</i>	
Joel Villavicencio Gastelu (Sao Paulo State University - UNESP, Brazil), Jonatas Leite (Unesp - Campus de Ilha Solteira, Brazil), Joel D Melo (Federal University of ABC, Brazil)	31

Energy Markets and Customer Engagement

<i>Analysis of Consumer-Centric Market Models in the Brazilian Context</i>	
Pedro Henrique Barbosa (UFJF, Brazil), Bruno Dias (UFJF, Brazil), Tiago Soares (INESCTEC, Portugal)	37
<i>Unified Power Quality Index Method Using AHP for Consumers Sensitivity Evaluation</i>	
Gilson Rosa de Castro (LACTEC, Brazil), Géssica Michelle dos Santos Pereira (LACTEC, Brazil), Pedro Augusto Biasuz Block (LACTEC, Brazil), Victor Baiochi Riboldi (CPFL, Brazil), Tuo Ji (CPFL Energia, Brazil), Xinjian Chen (CPFL Energia, Brazil)	43

New Technologies in HV: PMU

<i>Distributed Parametric Identification of Low Frequency Oscillatory Modes in Multiple PMU</i>	
Damián J. Viscarra (Universidad Nacional de San Juan & Instituto de Energía Eléctrica, Argentina), Graciela Colomé (National University of San Juan, Argentina)	49
<i>Towards a Colombian Power System Fully Supervised With PMU: Scalability Test of the iSAACnet Communications Network</i>	
Daniel Giraldo-Gómez (CIDET - Centro de Innovación y Desarrollo Tecnológico del Sector Eléctrico, Colombia), Brayan Arboleda (CIDET - Centro de Innovación y Desarrollo Tecnológico del Sector Eléctrico, Colombia), Pablo Viana-Villa (Universidad Nacional de Colombia, Colombia), Felipe Quintero-Zuluaga (CIDET - Centro de Innovación y Desarrollo Tecnológico del Sector Eléctrico, Colombia), Daniel Villegas (CIDET - Centro de Innovación y Desarrollo Tecnológico del Sector Eléctrico, Colombia), Mauricio Sánchez (XM SA ESP, Colombia), Alvaro Tobon (XM SA ESP, Colombia), Jorge Gomez (XM SA ESP, Colombia), Norberto Duque (XM SA ESP, Colombia)	55

Communications and Cybersecurity

<i>Disaggregation of Cold Appliance Loads from Smart Meter Data Processing</i>	
Thierry Zufferey (ETH Zurich, Switzerland), Gabriela Hug (ETH Zurich, Switzerland), Gustavo Valverde (University of Costa Rica, Costa Rica)	61
<i>Cybersecurity for Smart Substation</i>	
Wagner Hokama (Companhia Paulista de Força e Luz, Brazil), Juliane Soares de Souza (Companhia Paulista de Força e Luz, Brazil)	67
<i>A Customer Journey Mapping Approach to Improve CPFL Energia Fraud Detection Predictive Models</i>	
Lidia G Gusmão (CPFL Energia, Brazil), Hugo Helito (CPFL Energia, Brazil), Tales Anarelli (CPFL Energia, Brazil), Julia R Conceição (CPFL Energia, Brazil), Tuo Ji (CPFL Energia, Brazil), Gabriel Barros (No Affiliation, Brazil)	73

DEMAND RESPONSE

<i>Smart Charging Solution to Mitigate Electric Vehicles Recharge Demand Impacts on the Electric Grid</i>	
Flavio Faveri (CERTI Foundation, Brazil), Jorge Schmidt (CERTI Foundation, Brazil)	79
<i>Demand Response Program for Supercomputing and Datacenters Providing Ancillary Services in the Electricity Market</i>	
Sebastián Montes de Oca (Universidad de la República del Uruguay, Uruguay), Pablo Monzón (Universidad de la República, Uruguay), Gonzalo Belcredi (Universidad de la República & Instituto de Ingeniería Eléctrica, Uruguay), Sergio Nesmachnow (Universidad de la República, Uruguay), Jonathan Muraña (UdeLaR, Uruguay), Santiago Iturriaga (Universidad de la República, Uruguay)	85
<i>Estimating National End-Use Demand Curves Through Sub-measurements and Energy Surveys</i>	
Jam Angulo-Paniagua (University of Costa Rica, Costa Rica), Ignacio Alfaro-Corrales (University of Costa Rica, Costa Rica), Carmen Selva-López (University of Costa Rica, Costa Rica), Jairo Quirós-Tortós (University of Costa Rica, Costa Rica)	91
<i>Impact of Demand Response on Generation Expansion Planning in the Brazilian Interconnected Power System</i>	
Glaysson M Muller (Empresa de Pesquisa Energética, Brazil)	97
<i>Multi-Level Optimization Model for Electrical Energy Demand with User-Supplier Interaction</i>	
Sergio N. Braqaqnolo (CIDIIEE - Facultad Regional Córdoba - Universidad Tecnológica Nacional, Argentina), Jorge Vaschetti (CIDIIEE - Facultad Regional Córdoba - Universidad Tecnológica Nacional, Argentina), Fernando Magnago (National University of Rio Cuarto, Argentina)	103
<i>Review of Deep Learning Application for Short-Term Household Load Forecasting</i>	
Ana Karen Apolo Peñaloza (Universidade Federal do Rio Grande do Sul, Brazil), Alexandre Balbinot (Federal University of Rio Grande do Sul, Brazil), Roberto Chouhy Leborgne (Universidade Federal do Rio Grande do Sul, Brazil)	109

Planning and Operation

<i>Aplicación Del Método Point Estimation Para El Cálculo De Flujo De Carga Probabilístico En La Red De Transmisión Uruguaya</i>	
Vittorio Scopelli (Independent Professional, Uruguay), Pablo Pena (Universidad de la República & UTE, Uruguay)	115
<i>Planning Energy Distribution Systems in an Environment That Accelerates the Use of Distributed Energy Resources</i>	
Rafael Crochemore Ney (UFSM - Universidade Federal de Santa Maria, Brazil), Maicon Ferreira (UFSM - Universidade Federal de Santa Maria, Brazil), Marcelo Vianna (UFSM - Universidade Federal de Santa Maria, Brazil), Ricardo Orling (UFSM - Universidade Federal de Santa Maria, Brazil), Márcio Almeida Gama (UFSM - Universidade Federal de Santa Maria, Brazil), Luciane Canha (Federal University of Santa Maria (UFSM), Brazil)	121
<i>Optimal Allocation of Distributed Generation and Reactive Power in Simplified Distribution Systems</i>	
Richard Wilcamango Salas (Universidade Estadual Paulista (UNESP), Brazil), Ozy Daniel Melgar-Dominguez (São Paulo State University (UNESP), Brazil), José R S Mantovani (UNESP, Brazil)	127
<i>Prioritization of Isolated Communities for the Development of Renewable-Energy Projects in Wide Geographical Areas</i>	
Claudio Paredes-Budon (Universidad Austral de Chile, Chile), Lorenzo Reyes-Chamorro (Universidad Austral de Chile & Facultad de Ciencias de la Ingeniería, Chile)	133

Distributed Generation

Necessary Characteristics of a Modern Fuse for a Smart Grid, with Distributed Generation

- Juan Carlos Gomez (U.N. de Rio Cuarto, Argentina), Daniel Humberto Tourn (Universidad Nacional de Río Cuarto, Argentina), Gabriel Norberto Campetelli (Universidad Nacional de Río Cuarto, Argentina), Edgardo Florena (Universidad Nacional de Río Cuarto, Argentina), Germán Zamanillo (Universidad Nacional de Rio Cuarto, Argentina) 139

Fault Behavior of Power Distribution Networks with Distributed Generation and Uncertainties

- Laiz Souto (Universitat de Girona, Spain) 144

Computational Modeling of Excitation Systems in ATPDraw

- Pedro Henrique Eisenkraemer (Federal University of Santa Maria, Brazil), Mauro S. Ortiz (Federal University of Santa Maria - UFSM & Centro de Excelência em Energia e Sistemas de Potência, Brazil), Fabrício Moura (Federal University of Triângulo Mineiro, Brazil), D. Bernardon (Federal University of Santa Maria, Brazil), Emerson R. Silva (Federal University of Santa Maria & CEEESP, Brazil) 150

ELECTRIC MOBILITY

Methodology to Economic Evaluation of an Electric Vehicle Parking Lot Equipped with PV and Storage

- Edgar Bellini Xavier (Universidade Federal de Juiz de Fora, Brazil), Bruno Dias (UFJF, Brazil), Jairo Quirós-Tortós (University of Costa Rica, Costa Rica), Bruno Soares Moreira Cesar Borba (Universidade Federal Fluminense, Brazil) 156

An Evaluation of the Actual Electric Vehicles Charging Infrastructure in Uruguay and Possible Designing Approaches

- Claudio Risso (Faculty of Engineering, University of the Republic & Finq, Uruguay), Mario Vignolo (Facultad de Ingeniería, UDELAR, Uruguay), Juan Pedro Carriquiry (Faculty of Engineering, Udelar, Uruguay), Federico Arismendi (Universidad de la República-Facultad de Ingeniería-IIE & Universidad de la República, Uruguay) 162

Technical and Economic Feasibility of a PV Charging Station for E-bikes Considering a Lead-Acid Battery Degradation Model

- John E Barco-Jiménez (Universidad CESMAG, Colombia) 168

Greenhouse Gas Reduction Through the Introduction of Electric Vehicles in Urban Zones

- Iqoer Morro Mello (São Paulo State University (UNESP), Brazil), Fausta Faustino (Federal University of ABC, Brazil), Joel D Melo (Federal University of ABC, Brazil), Antonio Padilha Feltrin (UNESP-IS, Brazil) 174

Energy Autonomy of Electric Vehicles in Topologically Irregular Cities: Case Study Cuenca - Ecuador

- Marco Antonio Toledo (Universitat Politècnica de Valencia & CENTROSUR, Ecuador), Santiago P. Torres (University of Cuenca, Ecuador) 180

Energy Markets and Customer Engagement

Modern Energy Consumers Representation Perspectives in the Energy Sector

- Viviane Nascimento (University of São Paulo, Brazil), André Gimenes (GEPEA/EPUSP, Brazil), Miguel E. M. Udaeta (GEPEA/EPUSP, Brazil) 186

Towards a Coupled Regulation and Flexible Ramp Product Marginal Pricing

- Augusto A Lismayes (University of Santiago of Chile, Chile), Hector Chavez (Universidad de Santiago, Chile), Rodrigo Abarca (University of Santiago of Chile, Chile) 192

Impact of Energy Storage in Power Systems

Application of Energy Storage in Systems with High Penetration of Intermittent Renewables

- Lucas Narbondo (Ministry Industry, Energy and Mining & Dirección Nacional de Energía, Uruguay), Paola Falugi (Imperial College London, United Kingdom (Great Britain)), Goran Strbac (Imperial College London, United Kingdom (Great Britain)) 197

Pumped Storage Case Study in Uruguay: Simulation and Value

- Federico Sanz (Udelar & UTEC, Uruguay), Ruben Chaer (Institute of Electrical Engineering - University of the Republic Oriental del Uruguay, Uruguay), José Cataldo (Engineering Faculty Udelar, Uruguay) 203

Battery System Service to Reduce PV-Farm Operating Costs

- Juan Alemany (National University of Rio Cuarto, Argentina), Fabian Rinaudo (Universidad Nacional de Rio Cuarto, Argentina), Bruno Bignotti (UTN Entre Ríos, Argentina), Fernando Magnago (National University of Rio Cuarto, Argentina) 207

<i>A Technical Economical and Regulatory Analysis of Storage Systems Incorporation in the Uruguayan Electricity Market</i>	213
Virginia Halty (IFFI, Facultad de Ingeniería, Universidad de la República, Uruguay), Mario Vignolo (Facultad de Ingeniería, UDELAR, Uruguay), Ruben Chaer (Institute of Electrical Engineering - University of the Republic Oriental del Uruguay, Uruguay)	
<i>Análise Técnica e Simulação Econômica Para Aplicações De Sistemas De Armazenamento De Energia Com Baterias Nos Sistemas Elétricos De Potência</i>	
Luiz Felipe Vilela Fedalto (Enqetecnica Engenharia e Construção Ltda & Instituto de Tecnologia para o Desenvolvimento - LACTEC, Brazil)	219
<i>Stability Effects After Massive Integration of Renewable Energy Sources on Extra-Large Power Systems</i>	
Christoph Rüegger (Zurich University of Applied Sciences, Switzerland), Jean Dobrowolski (Zurich University of Applied Sciences, Switzerland), Petr Korba (Zurich University of Applied Sciences, Switzerland), Felix Rafael Segundo Sevilla (Zurich University of Applied Sciences, Switzerland)	225

Technical Operation of Energy Storage

<i>Analysis of Battery Energy Storage System Sizing in Isolated PV Systems Considering a Novel Methodology and Panel Manufacturers Recommended Methodology</i>	
Ahmad Abubakar (Universidade de São Paulo, Brazil), Carlos Frederico Meschini Almeida (University of São Paulo - USP, Brazil)	231
<i>Bat and Grey Wolf Techniques Applied to the Optimization of the Inverse Time Overcurrent Relays Coordination Problem</i>	
Gabrieli P Pizzolato (Federal University of Pampa, Brazil), Eduardo M dos Santos (Federal University of Pampa, Brazil), Arian R Faqundes (Federal University of Pampa, Brazil), Jefferson O dos Santos (Federal University of Pampa, Brazil), Humberto Hasselein (Federal University of Pampa, Brazil), Fernanda C Ramos (HCC Electrical Engineering, Brazil)	N/A
<i>Quadratic Approximate Dynamic Programming for Scheduling Water Resources: a Case Study</i>	
Aqustin Castellano (Universidad de la República & Uruguay, Uruguay), Camila Martinez (Universidad ORT, Uruguay), Pablo Monzón (Universidad de la República, Uruguay), Juan Andrés Bazerque (Universidad de la Republica, Uruguay), Andres Ferragut (Universidad ORT Uruguay, Uruguay), Fernando Paganini (Universidad ORT Uruguay, Uruguay)	243
<i>The Impact of Equalization Cycle on the Storage System Lifetime in PV-based Isolated Microgrids</i>	
Pedro Bezerra Leite Neto (Federal University of Maranhão, Brazil), Juarez Rocha Silva Neto (Federal University of Maranhão, Brazil), Osvaldo R Saavedra (Federal University of Maranhão, Brazil), Luiz Antonio Ribeiro (Universidade Federal do Maranhão, Brazil)	249

Modern Distribution Technologies

<i>Optimal Placement of Aggregators in Distribution Networks Using ZigBee Wireless Communication Technology</i>	
Byron Orlando Palate (Sao Paulo University & Independent Consultant, Ecuador), Enrique Gabriel Vera (University of Waterloo & IEEE, IEEE Power and Energy Society, Canada)	254
<i>Power Quality Study of Fixed Capacitor Selection for Rotary 1Ph-3Ph Converters in Rural Facilities</i>	
Andres Arquello (State University of Campinas & University of Costa Rica, Brazil), Thiago Fernandes (Universidade Federal de Pernambuco, Brazil)	260
<i>Distribution Network Voltage Controller in Presence of Lost Measurements</i>	
Andres Arquello (State University of Campinas & University of Costa Rica, Brazil), Gustavo Valverde (University of Costa Rica, Costa Rica)	266
<i>Comparing Chi-square-Based Bad Data Detection Algorithms for Distribution System State Estimation</i>	
Jam Angulo-Paniagua (University of Costa Rica, Costa Rica), Jairo Quirós-Tortós (University of Costa Rica, Costa Rica)	272
<i>On Evaluating Single-Phase Tripping on Distribution Networks</i>	
Rodrigo Tenorio Toledo (University of Brasilia, Brazil), Tiago Honorato (University of Brasília, Brazil), Kleber Silva (University of Brasilia, Brazil), Felipe Lopes (University of Brasília, Brazil)	277

Transmission: PROTECTION

Protection Relay for Secondary Ferroresonance Suppression in Coupling Capacitor Voltage Transformers

Julian Antonio Correa (Universidad Nacional de Colombia & Ingeniería Especializada, Colombia), Julián Vega (Universidad Nacional de Colombia & Ingeniería Especializada, Colombia) 283

A New Approach for Directional Overcurrent Relays Coordination in Interconnected Power Systems

Adriano Cavalheiro Marchesan (Federal Institute of Education, Science and Technology Farroupilha, Brazil), Klaus Martin (Farroupilha Federal Institute, Brazil), Olinto Araújo (Colégio Técnico Industrial de Santa Maria, Brazil), Samuel Hunsche (Federal University of Santa Maria, Brazil), Milena Zonin (Universidade Federal de Santa Maria, Brazil), Ana Paula Ghesti Marchesan (Federal University of Santa Maria, Brazil), Ghendy Cardoso Jr (Universidade Federal de Santa Maria, Brazil), Adriano Morais (UFSM, Brazil) 289

Current Transformer Modeling for Electromagnetic Transient Simulation in Protection Systems

Isabel Briozzo (School of Engineering, Universidad de la República, Uruguay), José Ignacio Afonso (Ingeniería de Protecciones, UTE, Uruguay), Pablo Toscano (School of Engineering, Universidad de la República, Uruguay) 295

Renewable Energies

A REFLEX Algebraic Reserve Constraint Model

Rodrigo Abarca (University of Santiago of Chile, Chile), Hector Chavez (Universidad de Santiago, Chile), Augusto A Lismayes (University of Santiago of Chile, Chile) 301

Mixture Density Networks Applied to Wind and Photovoltaic Power Generation Forecast

Damián Vallejo (ADME, Uruguay), Ruben Chaer (Institute of Electrical Engineering - University of the Republic Oriental del Uruguay, Uruguay) 307

Power Distribution Control

Optimized Voltage and Reactive Power Control in the Context of Advanced Distribution Automation

Thiago S. Medeiros (Universidade de São Paulo, Brazil), Raphael Toshio Sakai (Universidade de São Paulo & NAPREI, Brazil), José A. C. Júnior (Universidade de São Paulo, Brazil), Marcio R. da Cruz (Universidade de São Paulo, Brazil), Carlos Frederico Meschini Almeida (University of São Paulo - USP, Brazil), Nelson Kaqan (Universidade de São Paulo, Brazil), Gustavo T. A. da Silva (Neoenergia, Brazil), José A. S. Brito (Neoenergia, Brazil) 312

Voltage Regulation of Active Distribution Networks Considering Dynamic Control Zones

Luis E. Vargas (University of Costa Rica, Costa Rica), Jairo Quirós-Tortós (University of Costa Rica, Costa Rica), Gustavo Valverde (University of Costa Rica, Costa Rica) 318

Towards Distribution Feeders Frequency Response via Solid State Transformers

Carlos Fuentes (Universidad de Santiago, Chile), Hector Chavez (Universidad de Santiago, Chile), Esteban Riquelme (Universidad de Santiago, Chile) 324

Ranking of Priorities for the Management of Distribution Transformers: a Multicriteria Approach

Emerson R. Silva (Federal University of Santa Maria & CEEESP, Brazil), Dion Lenon Feil (Federal University of Santa Maria, Brazil), D. Bernardon (Federal University of Santa Maria, Brazil), Tiago Bandeira Marchesan (Federal University of Santa Maria, Brazil), Mauro S. Ortiz (Federal University of Santa Maria - UFSM & Centro de Excelência em Energia e Sistemas de Potência, Brazil), Pedro Henrique Eisenkraemer (Federal University of Santa Maria, Brazil) 330

An Approach to Advanced Distribution Automation in the Context of Smart Grid

Raphael Toshio Sakai (Universidade de São Paulo & NAPREI, Brazil), Carlos Frederico Meschini Almeida (University of São Paulo - USP, Brazil), Luiz Henrique Leite Rosa (Universidade de São Paulo, Brazil), Nelson Kaqan (Universidade de São Paulo, Brazil), Danilo Pereira (Universidade de São Paulo, Brazil), Thiago S. Medeiros (Universidade de São Paulo, Brazil), Henrique Kaqan (Sinapsis Inovação em Energia, Brazil), Marcio R. da Cruz (Universidade de São Paulo, Brazil), José A. C. Júnior (Universidade de São Paulo, Brazil), Gustavo T. A. da Silva (Neoenergia, Brazil), José A. S. Brito (Neoenergia, Brazil) 336

Power Distribution Instrumentation

Analysis of Loss Measurements on Distribution Networks Using Relaying Equipment

Alejandro Santos (UTE, Laboratory, Uruguay), Marcelo Brehm (UTE, Uruguay), Daniel Izquierdo (UTE Laboratory, Uruguay), Daniel Slomovitz (UTE, Uruguay) 342

<i>Distribution System State Estimation: A Primer for Application Based Research</i>	
Alexander C Melhorn (Electric Power Research Institute, USA), Nick Heine (Electric Power Research Institute, USA), Brian Deaver (Electric Power Research Institute, USA)	348
<i>Reproduction of a High Impedance Double Line-To-Ground Fault Using Real Oscillography Data</i>	
Wesley Heringer (Federal University of Pará, Brazil), Murillo Cordeiro (UFPA, Brazil), João Paulo Vieira (UFPA, Brazil), Juan Paye (Universidade Federal do Pará, Brazil), Ádrea Lima de Sousa (Universidade Federal do Pará, Brazil), Andre Pinto Leao (Universidade Federal do Pará, Brazil), Marcelo Santos (Pará Energy Equatorial, Brazil), Ghendy Cardoso Jr (Universidade Federal de Santa Maria, Brazil), Adriano Morais (UFSM, Brazil), Patrick Farias (IFRS, Brazil), Aldair Wontroba (Universidade Federal de Santa Maria, Brazil)	353
<i>Power Quality Meters Allocation Considering Strategic Positions in Distribution Systems and Using Genetic Algorithms</i>	
Joao V. G. Araujo (Universidade Federal dos Vales do Jequitinhonha e Mucuri, Brazil), Júlia Fernandes (UFVJM - Universidade Federal dos Vales do Jequitinhonha e Mucuri, Brazil), Jáder Breda (Universidade Federal dos Vales do Jequitinhonha e Mucuri, Brazil), José Carlos Vieira (University of São Paulo at São Carlos, Brazil)	359

Analysis of Distribution Networks

<i>Characteristics of High Impedance Faults in Overhead Distribution Networks in Bamboo Branches</i>	
Andre Pinto Leao (Universidade Federal do Pará, Brazil), João Paulo Vieira (UFPA, Brazil), Wesley Heringer (Federal University of Pará, Brazil), Ádrea Lima de Sousa (Universidade Federal do Pará, Brazil), Murillo Cordeiro (UFPA, Brazil), Juan Paye (Universidade Federal do Pará, Brazil), Maria Emilia de Lima Tostes (Federal University of Pará - UFPA & CEAMAZON, Brazil), Ubiratan Holanda Bezerra (UFPA, Brazil), Marcelo Santos (Pará Energy Equatorial, Brazil)	365
<i>Short-term Electric Load Forecasting Using Neural Networks: A Comparative Study</i>	
Symone Gomes Soares Alcalá (Federal University of Goias, Brazil), Lina Paola Garces (Universidade Federal de Goiás, Brazil), Luiz Gonzaga Rocha Junior (Computer Engineering School Federal University of Goias & Enel Distribuição Goiás, Brazil)	371
<i>Risk Mitigation Approaches for Improved Resilience in Distribution Networks</i>	
Jonatas Leite (Unesp - Campus de Ilha Solteira, Brazil), Mladen Kezunovic (Texas A&M University, USA)	377
<i>Evaluation of Power System Resilience Improvements in Low-Income Neighborhoods</i>	
Laiz Souto (Universitat de Girona, Spain), Surya Santoso (The University of Texas at Austin, USA)	383
<i>Assessment of Harmonic Distortion Associated with PV Penetration in a Low Voltage Distribution Network</i>	
Johanna S. Castellanos A. (Pontifícia Universidad Javeriana, Colombia), Diego Patiño Guevara (Pontifícia Universidad Javeriana, Colombia), Carlos Adrian Correa-Florez (Pontifícia Universidad Javeriana, Colombia), Gabriel Ordóñez-Plata (Universidad Industrial de Santander & UIS, Colombia)	388
<i>Assessment of the Technical Loss Calculation Method Used in Brazilian Distribution Systems</i>	
Tiaqo Barbosa (University of Campinas, Brazil), Rodrigo Bonadim (University of Campinas, Brazil), Ricardo Torquato (University of Campinas, Brazil), Paulo Meira (UNICAMP, Brazil), Felipe Bayma (University of Campinas, Brazil), Walmir Freitas (UNICAMP, Brazil), André Lemes (Companhia Paulista de Força e Luz (CPFL), Brazil), Luise Rodrigues (Companhia Paulista de Força e Luz (CPFL), Brazil), André Gastaldi (Companhia Paulista de Força e Luz (CPFL), Brazil), João Pedro Freitas (Companhia Paulista de Força e Luz (CPFL), Brazil)	394

Transmission: PROTECTION

<i>New Adaptive Protection Algorithm for Online Overcurrent Relay Setting in Interconnected Power Systems</i>	
Klaus Martin (Farroupilha Federal Institute, Brazil), Adriano Cavalheiro Marchesan (Farroupilha Federal Institute, Brazil), Olinto Araújo (Colégio Técnico Industrial de Santa Maria, Brazil), Milena Zonin (Universidade Federal de Santa Maria, Brazil), Amanda da Silva (Universidade Federal de Santa Maria, Brazil), Ghendy Cardoso Jr (Universidade Federal de Santa Maria, Brazil), Adriano Morais (UFSM, Brazil), Marcelo da Silva (Colégio Técnico Industrial de Santa Maria, Brazil)	400
<i>Analyzing Short-Circuit Current Behavior Caused by Inverter-Interfaced Renewable Energy Sources. Effects on Distance Protection</i>	
Juan Carlos Quispe H. (Universidad Nacional de San Juan & IEE UNSJ CONICET, Argentina)	406

New methods in Operation and Management

Islanding Detection and Resynchronization Based upon Wide-Area Monitoring and Situational Awareness in the Dominican Republic

Horacio D Silva-Saravia (Electric Power Group, USA), Iknoor Singh (Electric Power Group, USA), Joshua Chynoweth (Electric Power Group, USA), Norbo Mateo (ETED, Dominican Republic), Manuel Mejia (ETED, Dominican Republic), Simon Amadis (ETED, Dominican Republic), Rufino Alvarez (ETED, Dominican Republic) 412

A Single Busbar Model for Dynamic Studies of Power Systems Frequency

Juan Lima (UdelaR, Uruguay), Ignacio Nin Iewdiukow (Universidad de la República, Uruguay & Remind, USA), Alvaro Giusto (UDELAR, Uruguay) 418

Short-term Dispatch of Renewable Sources Considering Minimization of Active Losses and Generation Costs

Thales Sousa (Federal University of ABC, Brazil), Flávio S. Souza (Universidade Federal do ABC & FATEC Miguel Reale, Brazil), Eduardo Werley S. Ângelos (Federal University of ABC, Brazil) 424

Impact of Electrodes Configuration on Incident Energy Analysis Using IEEE Std 1584

Marina Camponogara (Federal University of Santa Maria - UFSM, Brazil), Ana Paula Ghesti Marchesan (Federal University of Santa Maria, Brazil), D. Bernardon (Federal University of Santa Maria, Brazil), Tiago Bandeira Marchesan (Federal University of Santa Maria, Brazil), Fernando Cesar Pepe (CPFL Energia, Brazil), Gilnei Jose Gama dos Santos (CPFL Energia, Brazil), Lucas Melo de Chiara (CPFL Energia, Brazil) 429

Excedentes Estructurales En Sistemas Con Alta Incorporación De Energías Renovables

Martín Sánchez (MIEM-DNE-Uruguay, Uruguay), Claudia R. Cabrera Ottaviani (Advisor, Dpt. Electrical Energy, DNE-MIEM, Uruguay), Virginia Echinope (Universidad de la República & Facultad de Ingeniería - Uruguay, Uruguay) 435

Renewable Energies and the Environment

Alternativas De Expansión Del Parque De Generación Eléctrica En Uruguay Según Diferentes Modelos

Claudia R. Cabrera Ottaviani (Advisor, Dpt. Electrical Energy, DNE-MIEM, Uruguay), Virginia Echinope (Universidad de la República & Facultad de Ingeniería - Uruguay, Uruguay), Vittorio Scopelli (Independent Professional, Uruguay) 441

Early Detection of Gearbox Damage, Development of ANN Forecast Maintenance Tool

Nicolás Geremías (Facultad de Ingeniería, Uruguay), Luis Chiruzzo (Universidad de la República, Uruguay) 447

Potential Induced Degradation (PID): Review

Hellen Ferreira Barreto Miranda (Instituto Federal de Educação, Ciência e Tecnologia Fluminense, Brazil), Luan Peixoto da Costa (Instituto Federal Fluminense, Brazil), Stefhany O Soares (Instituto Federal Fluminense, Brazil), Jonathan Velasco da Silva (Instituto Federal Fluminense, Brazil) 453

Energy and Greenhouse Gas Emission Potential of Northwest Mesoregion of the State of Rio Grande Do Sul, Brazil

Mauro Rodrigues (FAHOR, Brazil), Alzenira da Rosa Abaide (UFSM, Brazil), Gabriel Danielsson (Unijuí, Brazil), Leonardo Willers (Unijuí, Brazil), Marina Camponogara (Federal University of Santa Maria - UFSM, Brazil) 459

Distributed Solar Generation

Avaliação Probabilística Dos Impactos Técnicos Da Inserção De Microgeradores Fotovoltaicos e Veículos Elétricos Em Uma Rede De Distribuição

Luiz Eduardo Sales e Silva (Federal University of Pará, Brazil), João Paulo Vieira (UFPA, Brazil), Heitor Barata (Universidade Federal do Pará, Brazil), Vanderson Carvalho de Souza (Universidade Federal do Pará, Brazil), Wesley Heringer (Federal University of Pará, Brazil) 464

Impacts of Photovoltaic Systems in Distribution Networks Using Droop Control

Daniel Lima (University of São Paulo, Brazil), Lucas de Souza (University of São Paulo, Brazil), José Carlos Vieira (University of São Paulo at São Carlos, Brazil) 470

Optimal Sizing of Distributed Photovoltaic Generation in a MV Network

Jorge Torres (Escuela Superior Politécnica del Litoral, Ecuador), Angel Recalde (The University of Nottingham & Escuela Superior Politecnica del Litoral, United Kingdom (Great Britain)), Ivan Endara (Escuela Superior Politécnica del Litoral, Ecuador) 476

Transport Route Planning for Operation and Maintenance of Off-grid Photovoltaic Energy Systems in the Pantanal of Mato Grosso Do Sul

Géssica Michelle dos Santos Pereira (LACTEC, Brazil), Gabriela Rosalee Weigert (LACTEC, Brazil), Piero Silva Morais (LACTEC & Universidade Federal do Paraná, Brazil), Kiane Alves e Silva (LACTEC, Brazil), Cresencio Silvio Segura-Salas (Institutos LACTEC, Brazil), Antônio Maurício de Matos Gonçalves (Energisa Mato Grosso do Sul S.A., Brazil), Heber Henrique Selvo do Nascimento (Energisa Mato Grosso do Sul S.A., Brazil) 482

Impacts of Photovoltaic Insertion on Distribution Losses in the Amazon

Lucas Matheus S Lima (Universidade Federal do Acre & Centro de Excelência em Energia do Acre, Brazil), Vinicius Silva (GEPEA/EPUSP, Brazil), Thiago Lima (University of São Paulo, Brazil), Aline Gallina (Universidade Federal do Acre, Brazil) 488

Solar Power in Large Power Grids

Linear Fresnel Concentrator: A Review of Its Implementation in South American Countries

Santiago Gulino (Universidad del Cono Sur de las Américas, Paraguay), Jorge Rodas (Universidad Nacional de Asunción, Paraguay), Raúl Gregor (Universidad Nacional de Asunción, Paraguay) 494

Transitórios Eletromecânicos Em Sistemas Elétricos Com Forte Geração Fotovoltaica e STATCOMs Para Suporte De Resposta Inercial

Rafael Coutinho Pinto (Military Institute of Engineering, Brazil), Marcos Vinícius Pimentel Teixeira (Instituto Militar de Engenharia, Brazil), Paulo Cesar Pellanda (Military Institute of Engineering, Brazil) 500

Co-Optimization in the Operation of Hydroelectric and Solar Generation in the Province of San Juan: Methodology

Diego Ojeda-Estebar (Instituto de Energía Eléctrica - UNSJ - CONICET, Argentina), Ricardo G Rubio-Barros (National University of de San Juan, Argentina), Carlos López-Salgado (Instituto de Energía Eléctrica - UNSJ - CONICET, Argentina), Rolando Pringles (Instituto de Energía Eléctrica - UNSJ - CONICET, Argentina), Osvaldo Año (Instituto de Energía Eléctrica - UNSJ - CONICET, Argentina) 506

Study of the Effect of SCR and Controller Gains on System Stability in a Grid Connected Solar Plant

Swakshar Ray (ARMAX Automation Pvt Ltd, India), Shaik Salma (ARMAX Automation Pvt Ltd, India) 512

Instrumentation and Measurements in the Electric System

Rogowski Coil Design for the Measurement of High Voltage Harmonics

Rogelio Sandler (UTE, Uruguay), Marcelo Brehm (UTE, Uruguay), Daniel Slomovitz (UTE, Uruguay), Gabriela Barreto (UTE, Uruguay) 518

Current Transformer Model Validation on EMTP-ATP Software

José Ignacio Afonso (Ingeniería de Protecciones, UTE, Uruguay), Isabel Briozzo (School of Engineering, Universidad de la República, Uruguay), Pablo Toscano (School of Engineering, Universidad de la República, Uruguay) 523

Uncertainty Estimation in Luminous Flux Measured with Goniophotometers Using Monte Carlo Method

Javier A. Romero (Universidad Manuela Beltrán, Colombia), Claudia Caro-Ruiz (Universidad Manuela Beltrán, Colombia) 529

Modern Distribution Technologies

Practical PV Hosting Capacity Determination Using Load Factor of the Distribution Transformer

Carlos Vera Silva (Escuela Colombiana de Ingeniería Julio Garavito, Colombia), Agustín Rafael Marulanda (Escuela Colombiana de Ingeniería Julio Garavito, Colombia) 535

Application of Hardening Strategies and DG Placement to Improve Distribution Network Resilience Against Earthquakes

Mehdi Ahmadi (Sharif University of Technology, Iran), Mahdi Bahrampour (Sharif University of Technology, Iran), Mehdi Vakilian (Sharif University of Technology, Iran), Matti Lehtonen (Aalto University, Finland) 541

New methods in Operation and Management

Real-time Health Condition Monitoring of SCADA Infrastructure of Power Transmission Systems Control Centers

Jaime D. Pinzón (XM S.A. E.S.P., Colombia), Teresa Osorno (XM S.A. E.S.P., Colombia), Jorge Mola (XM S.A. E.S.P., Colombia), Alexandra Valencia (XM S.A. E.S.P., Colombia) 547

<i>Integrated Analysis of Electrical and Gas Transmission Networks Considering Primary Frequency Control</i>	553
José Luis Sánchez-Garduño (Universidad Michoacana de San Nicolás de Hidalgo, Mexico), Claudio R Fuerte-Esquível (Universidad Michoacana de San Nicolás de Hidalgo, Mexico)	
<i>Stochastic Assessment and Risk Management of Transient Stability Based on PowerFactory and Python Interface</i>	559
Marlon Santiaqo Chamba (CELEC EP & Operador Nacional de Electricidad CENACE, Ecuador), Walter Vargas (CELEC EP, Ecuador), Jaime Cepeda (CENACE, Ecuador)	
<i>Planning of Generation Investments with Risks of Severe Infrequent Events</i>	565
Gonzalo Casaravilla (Instituto de Ingeniería Eléctrica - Facultad de Ingeniería - UDELAR, Uruguay), Ruben Chaer (Institute of Electrical Engineering - University of the Republic Oriental del Uruguay, Uruguay), Ximena Caporale (ADME & Instituto de Ingeniería Eléctrica - Facultad de Ingeniería - UDELAR, Uruguay)	
<i>Linear Model for Dynamic Studies of Power System Frequency</i>	571
Fernando Figliolo (UTE, Uruguay), Alvaro Giusto (UDELAR, Uruguay)	

Smart and Micro-grids

<i>Analysis of Decentralized Control Techniques for Multigenerator Microgrid Islanded Operation with Traditional Controllers</i>	577
Dabit Gustavo Sonoda (Fundação Parque Tecnológico Itaipu - Brasil, Brazil), José Carlos Vieira (University of São Paulo at São Carlos, Brazil)	
<i>Quantification of the Impact of GHG Emissions on Unit Commitment in Microgrids</i>	583
Ogun Yurdakul (Technical University of Berlin, Germany), Fikret Sivrikaya (GT-ARC gGmbH & Technische Universität Berlin, Germany), Sahin Albayrak (Technische Universität Berlin, Germany)	

Renewable Energies: WIND POWER

<i>Analysis of Gibara 1 Wind Farm from 2015 to 2019</i>	589
Alejandra Sánchez-Aquiar (Technological University of La Habana José Antonio Echeverría (CUJAE), Cuba), Enrique Álvarez Rodríguez (Ministry of Energy and Mines, Cuba), Ariel Santos Fuentefría (Centro de Investigaciones y Pruebas Electroenergéticas (CIPEL), CUJAE, Cuba), Osvaldo Rodríguez-Reyes (Ministry of Energy and Mines, Cuba), Humberto Luis Riccomi (National Technological University (UTN) & Rosario Regional Faculty (FRRO), Argentina)	

Microgrids Operation

<i>Fuzzy Logic-Based Controller for BESS and Load Management in a Microgrid Economic Operation</i>	601
Rafael S. Salles (Federal University of Itajubá, Brazil), Gabriel C. S. Almeida (Universidade Federal de Itajubá, Brazil), Isaias Lima (Federal University of Itajuba, Brazil), Antonio Souza (Universidade Federal de Itajubá, Brazil), Paulo Ribeiro (Universidade Federal de Itajubá, Brazil)	
<i>Security-Constrained Energy Management System for Microgrids Under Uncertainty</i>	601
Jéssica Silva (State University of Campinas, Brazil), Juan López (State University of Campinas, Brazil), Nataly Arias (State University of Campinas, Brazil), Marcos Rider (State University of Campinas, Brazil), Luiz da Silva (State University of Campinas, Brazil)	
<i>A Microgrid Islanding Performance Study Considering Time Delay in Island Detection</i>	613
Darlan Ioris (Western Paraná State University, Brazil), Adriano B. Almeida (Western Paraná State University, Brazil), Paulo Godoy (Federal University of Itajuba, Brazil)	
<i>A Load Prioritization Model for a Microgrid Operation in the Islanded Mode</i>	619
Luna Leão Glória (CERTI Foundation, Brazil), Gabriel Costa (CERTI Foundation, Brazil), Débora Batissoco Sanches (CERTI Foundation, Brazil), Jessica Ceolin de Bona (Certi Foundation, Brazil), Neimar de Almeida Oliva (CERTI Foundation, Brazil), Cesare Quinteiro Pica (CERTI Foundation, Brazil), Mathias Ludwig (AES Tiete, Brazil)	
<i>Comparison Between Black Start and Islanding Process for the Establishment of a Rural Microgrid with Biogas Generator</i>	619
Patricia Poloni (Brazil), Breno Pinheiro (Brazil), Marcelo Brandt (Brazil), Vanderlei Ferreira (Brazil), Nadia Ribeiro (Brazil), Thiago de França (Brazil), Regério Meneghetti (Itaipu Binacional, Brazil), Maycon Georgio Vendrame (Itaipu Binacional, Brazil)	

Control Possibilities for Community Microgrids Considering Small Production Processes and Its Benefits to the Whole System

Christoph Strunck (TU Dortmund University, Germany), Danny Espín (University of Chile & Energy Center, Chile), Rodrigo Palma Behnke (Universidad de Chile, Chile), Christian Rehtanz (TU Dortmund University, Germany) 625

Microgrids Design

Resilient Microgrids with FACTS Technology

Luis A. Paredes (Universidad Nacional de San Juan - CONICET, Argentina), Marcelo G. Molina (Universidad Nacional de San Juan - CONICET, Argentina), Benjamín R Serrano (Universidad Nacional de San Juan - CONICET, Argentina) 631

Enabling Communications in Microgrids: A Comparison of Fiber-Optics, LoRa, and Wi-SUN

Rodrigo B. Otto (Itaipu Technological Park Foundation, Brazil), Diego A. C. Costa (Itaipu Technological Park Foundation & Laboratory of Automation and Simulation of Power Systems, Brazil), Almir A. Braqqio (Itaipu Technological Park Foundation, Brazil), Felipe P. Silva (Itaipu Technological Park Foundation, Brazil), Rodrigo Ramos (University of São Paulo, Brazil) 637

Design Characteristics of a Microgrid Controller for an Uninterruptible Power Supply with a Photovoltaic Generator

Cristian Daniel Aquirre Matteo (Universidad Tecnológica Nacional Facultad Regional Concordia, Argentina), Marcelo Julian Itzcovich (Universidad Tecnológica Nacional Facultad Regional Concordia, Argentina), Leonardo Schenberger (Universidad Tecnológica Nacional Facultad Regional Concordia, Argentina), Cesar Francisco Bordón (Facultad Regional Concordia & Universidad Tecnológica Nacional, Argentina), José Jorge Penco (Universidad Tecnológica Nacional, Facultad Regional Concordia, Argentina), Carlos María Chezzi (Universidad Tecnológica Nacional, Facultad Regional Concordia, Argentina) 643

Transmission Devices

Use of DC/DC Converters Modeled as AC-DC Converters in HVDC Grids

Fabiana Aparecida De Toledo Silva (Federal University of ABC, Brazil), José Antonio Jardini (Universidad de São Paulo, Brazil), Wilson Komatsu (Escola Politécnica – USP, Brazil) 649

Power Transformers Assessment Applying Health Index and Apparent Age Methods

Micael Marcio Oliveira (Federal University of Santa Maria & Smart Grids Institute, Brazil), Vitor Bender (Federal University of Santa Maria, Brazil), Tiaqo Bandeira Marchesan (Federal University of Santa Maria, Brazil), Antônio Kaminski (Federal University of Santa Maria, Brazil), Leonardo Hautrive Medeiros (Federal University of Santa Maria, Brazil), Helena Wilhelm (Veqoor Applied Technology, Brazil), José Batista Ferreira Neto (Santo Antonio Hydroelectric Power, Brazil) 655

Power Transformers with PCB-Contaminated Mineral Oil: The Natural Ester Fluid as a Replacement Alternative

Roberto Ignacio Da Silva (Cargill, Brazil), Andre Sá (ACS Laboratorios, Brazil) 661

Dissolved-Gas Analysis for Nitrogen-Blanketed Transformers

James Dukarm (Delta-X Research, Canada), Zachary Draper (Delta-X Research, Canada) 667

Structures in Power Lines and Ice Overload on Cables

Ricardo Manuel Arias Velásquez (Universidad Nacional de San Agustín de Arequipa, Peru), Jennifer Mejía (Universidad Nacional de San Agustín de Arequipa, Peru) 672

Novel Methods in Transmission

Influence of HVDC Systems Operation on the Out of Step Protection of Synchronous Generators

Robson A Oliveira (Itaipu Binacional, Brazil), José Carlos Vieira (University of São Paulo at São Carlos, Brazil) 678

Potential Benefits of Implementing Ambient Adjusted Rating in the Argentinean Transmission System

Mariano Tomás Anello (Universidad Tecnológica Nacional Facultad Regional Buenos Aires (UTN FRBA), Argentina), Alberto Del Rosso (Facultad Regional Buenos Aires, Argentina), Sergio Pascual (Investigador, Argentina) 684

Optimal Allocation of PMU and PDC in Electrical Power Systems

Lucas Luiz Lunarti (Pontifical Catholic University of Minas Gerais, Brazil), Maury Gouvêa (PUC Minas, Brazil) 689

Hardware in the Loop Design and Testing of a PMU-Based Special Protection Scheme: Case Study of Colombia-Ecuador Interconnection

- Felipe Quintero-Zuluaga (CIDET - Centro de Innovación y Desarrollo Tecnológico del Sector Eléctrico, Colombia), Pablo Viana-Villa (CIDET - Centro de Innovación y Desarrollo Tecnológico del Sector Eléctrico, Colombia), Daniel Giraldo-Gómez (CIDET - Centro de Innovación y Desarrollo Tecnológico del Sector Eléctrico, Colombia), Brayan Arboleda (CIDET - Centro de Innovación y Desarrollo Tecnológico del Sector Eléctrico, Colombia), Daniel Villegas (CIDET - Centro de Innovación y Desarrollo Tecnológico del Sector Eléctrico, Colombia), Mauricio Sánchez (XM SA ESP, Colombia), Camilo Perez (XM SA ESP, Colombia), Norberto Duque (XM SA ESP, Colombia) 695

Computing Transient Voltages on Grounding Grids Buried in Homogeneous and Stratified Soils

- Walter L. M. Azevedo (UNICAMP-State University of Campinas, Brazil), Anderson Ricardo Justo Araújo (UNICAMP-State University of Campinas, Brazil), Jose Pissolato (Unicamp, Brazil), Sérgio Kurokawa (UNESP, Brazil), Jaimis Sajid Leon Colqui (São Paulo State University, Brazil) 701

Faster-than-Real-Time Simulation of a Large Brazilian AC/DC Grid to Analyze Electromagnetic & Electromechanical Transients as Well as Commutation Failures

- Fabiana Aparecida De Toledo Silva (Federal University of ABC, Brazil), Felipe Pedroso (Universidade de São Paulo, Brazil), Jean Belanger (Opal-RT Technologies, Canada), José Antonio Jardini (Universidad de São Paulo, Brazil) 707

Simulation Tutorial in ATPdraw Software -IEEE 4 Nodes Test Feeder - Part 1

- Faronak Amorim Kharaghani (Federal University of Tocantins, Brazil), Natália dos Santos (Federal University of Tocantins, Brazil), Jadiel Silva (Federal University of Tocantins, Brazil), Stefani Freitas (Federal University of Tocantins, Brazil), Gabriela Santos (Federal University of Tocantins, Brazil) 713

Wind Generation

Generation of Wind Energy with Kites: a Review of the Airborne Wind Energy Technology

- Laura Barros Cordeiro Peçanha (Federal Institute Fluminense Campus Campos Centro, Brazil), Natalia de Souza Barbosa Oliveira (Instituto Federal Fluminense, Brazil), Wagner Vianna Bretas (IFF - Instituto Federal de Educação, Ciência e Tecnologia Fluminense, Brazil) 719

Simplified Analytic Procedure to Calculate the Electric Variables at Steady State of Type-III and Type-IV Wind Generators

- Andres Arguello (State University of Campinas & University of Costa Rica, Brazil) 725

A Review of Limitations of Wind Synthetic Inertia Methods

- Esteban Riquelme (Universidad de Santiago, Chile), Hector Chavez (Universidad de Santiago, Chile), Carlos Fuentes (Universidad de Santiago, Chile) 731

Wind Power Influence on Power Systems

Assesment of LVRT Requirements and Dynamic Behavior of a Mixed PMSG/DFIG Wind Power Plant

- Renata Ribeiro (Federal University of Rio Grande do Sul, Brazil), Roger de Oliveira (Luleå University of Technology, Sweden), Rafael Boeira (Federal University of Rio Grande do Sul, Brazil), Roberto Chouhy Leborgne (Universidade Federal do Rio Grande do Sul, Brazil), Math H. J. Bollen (Lulea University of Technology, Sweden) 737

Propagation of Supraharmonics Generated by PMSG Wind Power Plants into Transmission Systems

- Benhur Zolett (Universidade Federal do Rio Grande do Sul, Brazil), Roberto Chouhy Leborgne (Universidade Federal do Rio Grande do Sul, Brazil) 743

Short Review of the Evaluation Impacts of the Implementation of Wind Power Plants in the Interconnected Electric Systems

- Ronald Cabo (Fluminense Federal University, Brazil), Gabriel Barroso (Fluminense Federal University, Brazil), Nicolas Juan Manfredi (Fluminense Federal University, Brazil), Márcio Zamboti Fortes (Fluminense Federal University - UFF, Brazil), Sergio Gomes Jr. (Fluminense Federal University, Brazil) 749

Power Reserve Dispatch to Mitigate Variability of Generation Output Due to Wind Ramps

- Mauro Serqio Silva Pinto (Federal University of Maranhão', Brazil), Osvaldo R Saavedra (Federal University of Maranhao, Brazil) 754

Simulation Tools

Accuracy Analysis of Pvsyst Software for Estimating the Generation of a Photovoltaic System at the Polo De Inovação Campos Dos Goytacazes

Zulkner Cruz Viana (Instituto Federal Fluminense - Campus Campos-Centro, Brazil), Juliana Costa (IFF Campus Campos-Centro, Brazil), Jonathan Velasco da Silva (Instituto Federal Fluminense, Brazil), Rodrigo M Fernandes (Instituto Federal Fluminense, Brazil) 760

Correlation Between Insulation Resistance and Dissolved Gas Analysis Tests in Power Transformers

Juan Sebastian Juris (Escuela Colombiana de Ingenieria Julio Garavito, Colombia), Ivan Camilo Duran (Escuela Colombiana de Ingqenieria Julio Garavito, Colombia), Agustin Rafael Marulanda (Escuela Colombiana de Ingenieria Julio Garavito, Colombia) 766

Hourly Model of a Combined Cycle Power Plant for SimSEE

Vanina Camacho (ADME, Uruguay), Ruben Chaer (Institute of Electrical Engineering - University of the Republic Oriental del Uruguay, Uruguay) 772

Introduction of Ensemble Based Forecasts to the Electricity Dispatch Simulator SimSEE

Guillermo Flieller (ADME, Uruguay), Ruben Chaer (Institute of Electrical Engineering - University of the Republic Oriental del Uruguay, Uruguay) 777

Additional Paper

Customer Buses Ranking for Battery Energy Storage System Installation through Pairwise Analyses: a Study of Case

G. M. dos Santos Pereira, F. J. Lachovicz, P. S. Morais, P. L. Macedo, P. A. B. Block (LACTEC, Curitiba, Brazil) V. B. Riboldi, T. Ji, X. Chen (CPFL ENERGIA S. A. , Campinas, Brazil) 783