2009 IEEE/PES Power Systems **Conference and Exposition**

(PSCE)

Seattle, Washington, USA 15 – 18 March 2009

Pages 1-693



IEEE Catalog Number: CFP09PPS-PRT ISBN:

978-1-4244-3810-5

PSCE 2009 Table of Contents

Track 1: System-Wide Events and Analysis Methods

Power System Dynamic Performance 1

Chair: Co-Chair:	Vijay Vittal, Arizona State University Anurag Srivastava, Mississippi State University	
Sponsor:	Power System Dynamic Performance	
	e Scheme for Mitigation of Voltage Instability Rene Feuillet; AliMohammad Ranjbar and Babak Mozafari	1
Distribution Sy		
	G. C. Guimaraes; Aloí-sio de Oliveira; M. L. R. Chaves; and VinÃ-cius Benichio	8
Implementation Voltage Compe	n of a Control Strategy for Dynamic Voltage Restorer(DVR) and Dynamic ensator(DVC)	С
Ahad Kazemi a	and Ali Azhdast	15
	Assisted Controlled Islanding for Preventing Cascading Events; Vijay Vittal; Kai Sun; Sharma Kolluri; Sujit Mandal and Floyd Galvan	21
	Dynamic Security Classification Using Kohenen Neural Networks eza Aghamohammadi; Fazel Mahdavizadeh and Reza Bagheri	29
	pact of Air Conditioner Under-Voltage Protection Schemes ang; Zhenyu Huang and Richard Bravo	36
Peng Li; Baohu	Optimizing Re-Closing Time to Improve the Transmission Capacity ii Zhang; Zhiguo Hao; Zhiqian Bo; Andrew Klimek; Yufei Rao ng	44
C	asor Measurement Systems and Interarea Planning	
Chair: Sponsor:	Michael I. Henderson, New England ISO Power System Planning and Implementation	
Utility Planning Tony Weekes a	g for a Wide Area Measurement System and Brian Archer	50
Area Phasor Mo	ted System Planning Study Conceptual Transmission Plans and the Wide easurement System Potential Applications Zheng Zhou and Liangying Hecker	57
Nischal Dahal;	nitoring using Common Information Model and Sensor Web Vinoth Mohan; Surya Durbha; Anurag Srivastava; Roger King; Nicolas pel Schulz	62

Testing
A. Ghassemian and Bruce Fardanesh
Benchmarking of Planning Models Using Recorded Dynamics Zhenyu Huang; Bo Yang and Dmitry Kosterev
Cascading Failures: Mitigation and Restoration
Chair: Pei Zhang, EPRI Sponsor: Power System Analysis, Computing, and Economics
Vulnerability Assessment for Cascading Failures in Electric Power Systems IEEE CAMS Task Force on Cascading Failures IEEE and Zhenyu Huang
Analysis and Control of Major Blackout Events Koji Yamashita; Juan Li; Pei Zhang and Chen-Ching Liu92
Probabilistic Reliability Assessment for Transmission Planning and Operation Including Cascading Outages Stephen Lee
Modeling, Simulating and Online Setting-Checking for Protective Relay Hongbin Sun; Boming Zhang; Ying Lu; Zhelong Pan and Wenchuan Wu104
Deployment and Applications of Synchronized Phasor Measurements
Chair: Sujit Mandal, Entergy Co-Chair: Richard Schulz, Consultant Sponsor: Power System Dynamic Performance
Coordinating Power Oscillation Damping Control Using Wide Area Measurements Emil Johansson; Kjetil Uhlen; Albert B. Leirbukt; Petr Korba; Jan Ove Gjerde and Lars Kristian Vormedal
Implementation of CSG's Wide-Area Damping Control System: Overview and Experience Li Peng; Wu Xiaochen; Lu Chao; Shi Jinghai; Hu Jiong; He Jingbo; Zhao Yong and Xu
Aidong
On the Use of df/dt in Power System Emergency Control Hassan Bevrani; Gerard Ledwich and J. J. Ford
Phasor Measurement Units (PMU) Instrumental in Detecting and Managing the Electrical Island Created in the Aftermath of Hurricane Gustav Floyd Galvan; Sujit Mandal and Mark Thomas
Preliminary Synchronized Phasor Data Analysis of Disturbance Events in the US Eastern Interconnection Joe H. Chow; Luigi Vanfretti; Andrew Armenia; Scott Ghiocel; Sanjoy Sarawgi; Navin Bhatt; David Bertagnolli; Meera Shukla; Xiaochuan Luo; Dean Ellis; Dawei Fan; Mahendra Patel; Andrew Hunter; Dave Barber and Gary L. Kobet

Power System Dynamic Performance 2

Chair: Sponsor:	Anurag K Srivastava, Mississippi State University Power System Dynamic Performance	
and Dynamic Ap	Collapse Cases of a Large Power System Using Static proaches and Vijay Vittal	144
Network as a Pre	y Constrained Rescheduling Using Stability Sensitivities by Neural eventive Tool a Aghamohammadi; Ali Maghami and Farzad Dehghani	152
Improvement und A Comparative A	tralized Non-Linear Controller for Transient Stability der Symmetrical and Unsymmetrical Fault Conditions: Analysis with SSSC and K. Vaisakh	159
through Observa		177
Review of Robus	ing Liao; Zhiqiang Yuan and Hongman Yanst Feedback Control Applications in Power Systems	
	meter Derivation for Power Plant Models Based on Staged Tests	178
	on for On-Line Estimation of Power System Electromechanical Modes Trudnowski and John Pierre	187
A Real Shipboard He Chen; Zongxi	d Power System and Its Computer Simulation iang Lu; Jun Ye and Shuangxi Zhou	195
Reliability and l	Risk Management	
Chair: Sponsor:	Milorad Papic, Idaho Power Power System Analysis, Computing, and Economics	
	city Purchasing Risk Decision Under Real-Time Pricing Kifan Wang	202
	robabilistic Techniques in Asset Management Luiz Cheim and Baldwin Lam	208
	the Distribution of 23 Years of Electrical Disturbance Data	215
Distributed Mode		
Liu Wen-Xia; Li	u Nian; Fan Yong-Feng; Zhang Li-Xin and Zhang Xin	223

Track 2: Integrating Wind Energy

Wind Power: M	Ianaging Uncertainty	
Chair: Sponsor:	Michael Milligan, National Renewable Energy Laboratory Power System Analysis, Computing, and Economics	
	Time Balancing Prices in Wind Power Systems and Lennart Söder	229
	ind Profile on Thermal Units Generation Costs adi and Ehab El-Saadany	238
Commitment Po	y-Ahead Uncertainty Management through Stochastic Unit licies s Philbrick and Peter Sauer	244
	and Estimation for Operations Reliability	
Chair: Sponsor:	Renato Cespedes, KEMA Power System Operations	
	t Blackout - Return of Experiences on Utility Operation IT Infrastructure ier and Jay Giri	253
	Mitigating the Voltage Collapse Problem in the Natal Network án; Marcos Donolo; Mani Venkatasubramanian and Franco de Villiers	260
	-based Linear State Estimator bin Sun and Anjan Bose	265
	Critical Measurements in the Power System Network and Anant Oonsivilai	271
	racking And Dynamic State Estimation nivakumar N. R.	277
and Median Filte	y State Values from Phasor Measurement Unit Data Using FIR ers Thomas J. Overbye	285
PSDP Committ	ee Meeting and PSDP Wind Power Paper Session	
Chair: Sponsor:	Zhenyu (Henry) Huang, Pacific Northwest National Laboratory Power System Dynamic Performance	
Estimation of W IEEE Std. 1459-	ind Farms Working in Presence of Voltage Dips Using the 2000	
	ana-Romeu; Vicente León-Martínez; José Roger-Folch; Lázaro; M. Cañas; Juan Alvaro Fuentes and A. Molina	293

	tion of a Hybrid Wind Power System Using RPMSim Wenzhong Gao; Rick Carson and Vadim Zheglov	299
System by SMES		
Hee-yeol Jung; D	ae-Jin Park; Hyo-Ryong Seo; Minwon Park and In-Keun Yu	306
	y of the Grid with a Wind Power Plant Tony Nguyen and M. A. Pai	312
Fluctuations of a	ping Controller for a SMES Unit to Suppress Tie-Line Active-Power Large-Scale Wind Farm Shong Chen; Wei-Jen Lee and Zhe Chen	319
Generator-Based	Enhancement of Grid Fault-Induced Torsional Oscillations for Induction Wind Turbines a; Salman Salman and Kenneth Smith	326
	of Wind Turbines of Large Wind Farm J. Jiang and Thordur Runolfsson	333
Power System No	and Variable Speed Wind Generators on the Transient Stability of a etwork Severus Sheetekela	340
	Vind Turbine Generator Models Response to Disturbances n	347
	Offshore Wind Farms on Power System Transient Stability ga; Istvan Erlich and Jose Rueda	355
Renewable Powe	er Generation	
Chair: Co-Chair: Sponsor:	Mohamed A. H. El-Sayed, University of Trinidad and Tobago Wenzhong Gao, Tennessee Technological University Energy Development and Power Generation	
by Wind Turbine	ng and Control of Doubly Fed Induction Generators Driven s	363
Case Study	for the Identification of the Sustainable Wind Potential. The Portuguese aulo Costa and Ana Estanqueiro	371
Generation Using	Low Voltage Ride-Through Control Strategy for Wind Power Real Time Digital Simulator Ge Wang and Jiaxin Ning	378
and Network Rel	ning and the Sustainable Power System: A Focus on Flexibility Needs iability	384

	Zhong and George Weiss	390
Single-Outpu	e Combination of UPQC and Photovoltaic Arrays with Multi-Input at DC-DC Converter ari; Sayyed Mahdi Ale-Emran; Hesam Yazdanpanahi	
	3. Gharehpetian	396
	nd Wake Effect Modeling for Simulation of a Studied Power System g and Weiqing Wang	403
Short Term	Forecasting in Operations	
Chair: Sponsor:	Mo El-Hawary, Dalhousie University Power System Operations	
	nefits of a Dedicated Probabilistic Rapid Ramp Event Forecast Tool ter; Eric Grimit and Bart Nijssen	409
The Hydro-Q	a Acquisition for the Short Term Wind Power Forecasting in a Large Grid Québec SAGIPE System Experience et; Jacques Bourret and Jean-Emmanuel Maubois	
	ead Wind Speed Forecasting Using Wavelets and Mohammed Shahidehpour	421
Impact of Lo Rui Bo and F	ad Forecast Uncertainty on LMP Fangxing Li	426
	e Model Applied To The Short-Term Bus Load Forecasting Problem ado; Rosangela Ballini and Takaaki Ohishi	432
Wind Power	: Analyzing System Impacts	
Chair: Sponsor:	Michael Milligan, National Renewable Energy Laboratory Power System Analysis, Computing, and Economics	
•	and Mark O'Malley	440
	l Island Grid Study" - Methodological Approaches and Outcomes and Diane Broad	449
	equirements with High Wind Generation Penetration in the ERCOT Markey; Lavelle Freeman and Warren Lasher	
	odeling Wind Power Using Markov Chains	461

Track 3: Emerging Software Needs for the Restructured Grid

Distribution System Trends - Analytical Methods

Chair: Sponsor:	Tom McDermott, EnerNex Corporation Power System Analysis, Computing, and Economics	
	IEEE PES Test Feeders V. Kersting; S. Carneiro, Jr.; R. Arritt and T. McDermott	467
	nd Application of Step Voltage Regulators	471
	ver Flow for Smart Grid Technologies ; David Chassin; Y. Chen and Jason Fuller	479
•	tem State Estimation using AMI Data I T.E. McDermott	486
Distribution Sys	stem Trends - Data Integration	
Chair: Sponsor:	Tom McDermott, EnerNex Corporation Power System Analysis, Computing, and Economics	
	oution System Analysis - Integral Part of DMS and Volker Landenberger	489
	er Electric System Modeling, Assessment and Reliability Prediction Yishan Liang; Dan Zhu and Robert P. Broadwater	495
Distribution Syst		501
_	Terry Nielsengration of Demand Response and Meter Data	501
Enter prise integ	gration of Demand Response and Weter Data	
Chair: Sponsor:	Ali Vojdani, UISOL Power System Operations	
	ration of Demand Response and Meter Data	505
	from Real-Life Implementation of Demand Response Management	506
	Standards for Small Demand Resources	507
	anced Metering Data into the Enterprise	510

	reat River Energy with Meter Data Management	511
Distribution Man	mand Response Contracts with Operational Reliability Indices in nagement System	512
High Performa	nce Computing Applications in Power Systems	
Chair: Co-Chair: Sponsor:	Joseph (Zeb) Tate, University of Toronto Zhenyu (Henry) Huang, Pacific Northwest Labs Power System Operations	
	Algorithms for On-Line Extended-Term Dynamic Cascading Analysis tan; Chuan Fu and James McCalley	513
Chika Nwankpa;	Results for Power System Computation g Jeremy Johnson; Prawat Nagvajara; Timothy Chagnon anukunkiet	520
	Estimation Utilizing High Performance Computing Methods ; Zhenyu Huang; Bo Yang; Matt Hauer and Y. Nieplocha	523
	ences on High Performance Power System Applications Implementation	529
	Based Distributed Computing Platform for New Generation of EMS Chuanlin Zhao and Wenchuan Wu	532
Intelligent Syste	ems	
Chair: Sponsor:	Manisa Pipattanasomporn, Virginia Tech Power System Analysis, Computing, and Economics	
Cascaded Hydro	ve Particle Swarm Optimization for Long-Term Optimal Scheduling of power Station; Xianjue Luo and Hai Yu	539
Test Bed Study	olding in Restructured Wholesale Power Markets: An Agent-Based Leigh Tesfatsion	544
	rnel Machine for Short-Term Load Forecasting	
	ng Dai; Yijia Cao; Guixiang Zhai and Zhaoyan Liu	555
	tion Management Using PSO and Real Coded Genetic Algorithm nder and Vinod Kumar D.M.	561
	PSO Approach For Reactive Power Management Problem and Hamid Lesani	567

CIM Status Update

Chair: Sponsor:	Ed Dobrowolski, NERC Power System Operations	
	entation Update rowolski	573
Justifying the Terrence Sax	e CIM ston	574
	ne Use of CIM in an EMS Project	575
CIM Update		576
Kendan Den	naree	370
	action with IEC es	577
	Management	578
	Management of Large Scale Network Models	579
Operations	Scheduling and Dispatch	
Chair: Sponsor:	Jagjit Singh, OATI Power System Operations	
	Control Approach for Long Term Hydrothermal Scheduling belli and Secundino Soares	581
Contribution	ordinated Maintenance Scheduling in Deregulation Based on Genco to Unserved Energy	500
Hemantkuma	ar Barot and Kankar Bhattacharya	589
	od Combined with PSO for Economic Dispatch with perating Zones	
Karri Chandı	ram; Nallamothu Subrahmanyam and Maheswarapu Sydulu	590
	cheduling for a Price Taker Genco in Competitive Power Markets estha and Qiao Songbo	597
Fuzzy Infere	nce Systems Approach for Long Term Hydrothermal Scheduling	
	e and Secundino Soares	603

Track 4: Control System Robustness Today and in the Future

Network Solutions Using FACTS

Chair: Sponsor:	Brian Johnson, University of Idaho Transmission and Distribution	
	ACTS Controllers	610
	roblems Solved by FACTS Devices Frank Schettler	616
Studies	ntrollers Benefit AC Transmission Systems - Phases of Power System	
Planning Issues		
	and FACTS in New England son; David Bertagnolli and Donald Ramey	629
Real-Time Stab	ility Assessment in Modern Power System Control Centers Panel	
Chair: Sponsor:	Savu C. Savulescu, ECIQS Power System Operations	
	ient Security Assessment in Australia at NEMMCO y and Ellis Gentle	632
	ly Future of Real-Time Transient Stability? ouis Wehenkel and Mania Pavella	638
Herzegovina and	lity Assessment in the Control Centers of the ISO of Bosnia and a National Dispatching System in North Africa af Ruhle and Dusko Vickovic	641
Overview of Key	Stability Concepts Applied for Real-Time Operations	
	ation of Real-Time Stability Monitoring in a	
	I Janos Hajagos	652

Advanced Controls for Distribution Systems

Chair: Sponsor:	Brian Johnson, University of Idaho Transmission and Distribution	
	mentAn Essential "SMART" Function	658
with Distributed	tudy of Control System for Distribution System Generation Satoshi Uemura and Hiromu Kobayashi	665
Means of Multi-A	Itage Control Scheme for Distribution Systems by Agents Naoto Yorino; Nobuaki Toga and Hiroaki Sugihara	671
On-Line Automa A Distribution Fe	tic Switching of Consumers' Connections for Improved Performance of	
Improving the D	ynamic Performance of Wind Farms With STATCOM d Badrul Chowdhury	
Farm Subject to	et Transform-based Approach for Evaluating the Performance of a Wind Voltage Sag according to IEEE Standard 1459-2000 Mohamed El-Hawary	694
Advances in Ele	ectric Machines & Drives	
Chair: Sponsor:	Professor Osama Mohammed, Florida International University Electric Machinery	
Motor at Low Sp	nization for Sensorless Position and Speed Control of Permanent Magnet need using Genetic Algorithm I Osama Mohammed	701
	rical and Aerodynamic Characteristics for DFIG Speed Control Study Haskew and Shukul Mazari	706
Nonlinear Contro Yi Guo; John Jia	ol of Wind Power Generation Systems ng and Choon Yik Tang	714
Signal-Injection	onous Machine Parameter Extraction from Small Techniques Fing Huang	721

Techniques and Technology for a Secure Grid

Chair:	Siri Varadan, KEMA	
Sponsor:	Power System Planning and Implementation	
Navin Bhatt; Sar Margaret Leschu Maryclaire Peter	rability to Cascading Outages njoy Sarawgi; Rob O'Keefe; Patrick Duggan; Matt Koenig; nk; Stephen Lee; Kai Sun; Sharma Kolluri; Sujit Mandal; son; Daniel Brotzman; Steven Hedden; Eugene Litvinov;	
Slava Maslennik	ov; Xiaochuan Luo; Edvina Uzu	722
	Novel Locational Reliability Index in Power Systems arot and Kankar Bhattacharya	731
Protection System		720
Kai Jiang and Ch	nanan Singh	738
	ctive Power Planning against Power System Voltage Instability a; Haifeng Liu and James McCalley	748
and Future Grid	Transmission Technology That Is Compatible With the Existing	
	hn Marczewski; Robert D'Aquila; Paul Hassink; Jim Roedel	756
Transmission P	lanning for a Robust Grid	
Chair: Sponsor:	Fran Li, University of Tennessee Power System Planning and Implementation	
	anning Risk Indices - What now? I Jasper van Casteren	763
Pei Zhang; Liang	on Experience of Probabilistic Risk Assessment Method g Min; Liana Hopkins; Bruce Fardanesh; Prakash Patro; Mark Graham and Dillwyn Ramsay	770
A Method of Eva	aluating Transmission Network Expansion Plan Considering Security	770
	Supply Reliability Index Kenji Okada and Hiroshi Asano	777
over Long Term	a Support Tool to Level Transmission Equipment Replacements	702
iviasaki Nagata; .	Arisa Takehara and Ikuo Kurihara	/83
	on the Use of HVDC for CREZ Transmission Anthony Wayne Galli; Michael Hutson and Ramon Nadira	790
New Generation		
Jeff Smith; Bhas	kar Ray; Kyung Soo Kook and Pouyan Pourbeik	797

Track 5: The Smart Grid and the Internet

Cyber-Physical System Security - Assessment

Chair: Sponsor:	Manimaran Govindarasu, Iowa State University Power System Analysis, Computing, and Economics	
-	of Information Security in Cyber-Physical Power Systems	803
	Cyber Risk Assessment of Power Control Systems with Experimental Data and Systems and Judit Szanto	805
	y of SCADA Systems: Vulnerability Assessment and Mitigation Liu; Chee Wooi Ten and Manimaran Govindarasu	808
	npacts from Cyber Attack on Electric Power Systems Annie McIntyre and Bryan Ricardson	811
Research Fr	ontiers for the Smart Grid: University-Industry Partnership	
Chair: Sponsor:	Mladen Kezunovic, Texas A&M University Power Engineering Education	
	utomation Research Frontiers novic	819
Using Synch Mani Venkat	Monitoring and Control Algorithms for Large Power Systems rophasors asubramanian; Xunning Yue; Guoping Liu; Michael Sherwood nang	821
	n System Visualization for the SmartGrid rbye	826
	spectives on University Research Programs	828
	of Energy/University Research: A Smart Partnership for a Smart Grid	829
Cyber-Physi	ical System Security - Methods	
Chair: Sponsor:	Manimaran Govindarasu, Iowa State University Power System Analysis, Computing, and Economics	
	rchitecture Models for Cyber Security Analysis edt and Teodor Sommestad	832

Nouredine H	ber and Physical Interdependencies – Application in ICT and Power Cadjsaid; Carolina Tranchita; Benoit Rozel; Maria-Georgetta Viziteu Caire	
	ASPInet Data Flows ; Rakesh Bobba and Himanshu Khurana	844
Cyber Securi	ty of the Electric Power Grid	
Demand Res	sponse at ISOs under Smart Grid	
Chair: Sponsor:	Farrouk Rahimi, OATI Power System Operations	
	ponse under the SmartGrid Paradigm	852
	Demand Response at Different ISO/RTOs	853
	ective on Demand Response under the Smart Grid Paradigm	855
	Demand Response into Wholesale Electricity Markets id; Spence Gerber and Parviz Adib	857
	siness Models for Demand Response under the SmartGrid Paradigm	858
	f the Future with Large Scale DR/DER Penetration	859
Distribution	System Planning and Management	
Chair: Sponsor:	Robert Fletcher, Snohomish County PUD Power System Planning and Implementation	
Alaa Mohd;	Control and Energy Management of an Inverter-based Modular Smart Egon Ortjohann; Worpong Sinsukthavorn; Max Lingemann; sic and Danny Morton	
	ted Generator Placement and Sizing Test Suite and Analysis Tool David Cornforth and Glenn Platt	866
System Reins Edwin Haese	s for Active DER Management in Deferral of Distribution forcements en; Arturo Alarcon-Rodriguez; Johan Driesen; Ronnie Belmans Ault	875
	oroach to Disco Planning in Electricity Markets: Mathematical Model i and Kankar Bhattacharya	883

	alue of Distribution Infrastructure Replacement nan (Sam) Chien and Roger Lee8	88
Track 6: Non	Track Session	
Analytical Meth	nods 1	
Chair: Sponsor:	Chan-Nan Lu, National Sun Yat-Sen University Power System Analysis, Computing, and Economics	
Model Parameter	Vector Machine (SVM) to Improve Generalization Ability of Load rs ang Dong and Pei Zhang	05
A Reduced-Orde System in a Dere	er Estimator with Prescribed Degree of Stability for Two-Area LFC egulated Environment	
Estimation Meth Naoki Gibo; Tos	and Javad Sadeh	
	ase Fast Decoupled Power Flow Abhijith B. and G. Kasi Viswanadha Raju9	17
Co-optimizing I	Energy and Ancillary-Service Markets: Lessons Learned	
Chair: Sponsor:	Khai Lee, PCI Power System Operations	
and Lessons Lea		
	Implementing Simultaneous Co-Optimization in the Midwest ISO	22
Energy and Oper	rating Reserve Markets	24
Ancillary-Servic	perience with Operating Genco Assets in New MISO e Market d Renee Tumbleson	26
	ization to Clear Energy and Ancillary Services in MRTU Market	27
	Bidding Ancillary Services in ERCOT: A Modeler's Perspective	29
	Ancillary Services in ISO New England's LMP Markets; Ronald Coutu and Tongxin Zheng9	31

Developments in Power System Operations

Chair: Sponsor:	Edward Dobrowolski, NERC Power System Operations	
	ementation Framework for Calculation and Allocation of Expected Energy en; Brian Johnson and Mike York	
	perations Framework for Discos in Retail Electricity Markets i and Kankar Bhattacharya	943
Power System Emanuele Ci	apessoni; Diego Cirio; Stefano Massucco; Andrea Pitto	0.4.4
	Silvestro	
Solved as a F	of Initiating Controlled Islanding of a Large Interconnected Power System Pareto Optimization and Gerald Heydt	
	System Approach for Power System Automation and Self Healing semi and Ali Feliachi	959
Hector Sarmi	for Assistance in Voltage Security Visualization iento; Gabriela Pampin; Raul Barajas; Rafael Castellanos; a and Manuel Mirabal	966
Electric Ma	chinery & Applications	
Chair: Sponsor:	Professor Osama Mohammed, Florida International University Electric Machinery	
The Technique Oleg Agama	ue of Clustering Analysis of Partial Discharge.	972
Signal-Proce	nhancement of Wind Turbine Blades Using Novel ssing Approaches	
Chin-Shun T	sai; Shyh-Jier Huang and Cheng-Tao Hsieh	981
Disturbance	chronous Generator Parameters Estimation Based on Applying Small on Excitation System Using ANN	
	npour; Mohammad Ali Talebi; Heydar Ali Shayanfar nad Reza Azad Hosseini	988
	a Low Cost Power Quality and Energy Measurement Technology - The wer Quality Monitoring	
	nern and Andreas Eberhard	992

FACTS

Chair: Sponsor:	Kala Meah, York College of Pennsylvania Power System Dynamic Performance	
Converter Desig	amic Model of a Voltage-Sourced Converter with Modular Multilevel gn en	996
	rmance of the New 400 kV Storebaelt HVDC Project en; Carsten Rasmussen and Hans Abildgaard	1002
after Generation	a HVDC Link to Promote Stability by Sharing Dynamic Reserve Power a Deficiencies ah and Ahmed Ebrahim	1009
Design of Integ	rative Fuzzy Logic Damping Controller of VSC-HVDC ua Zhang; Guohua Zhang; Jingfu Shang; Mingxia Zhou and Yinhui Li	
Power System N	ly of the CIGRE HVDC Benchmark Model with the WSCC Nine-bus Network A.H.M. Sadrul Ula	1025
Power System (nent and Signal Selection for Wide-Area Controlled UPFCs for Damping Oscillations mi and Mariesa Crow	1030
	nent of FACTS Devices for Multi-Objective Voltage Stability Problem ; Mohamed Boudour and M. A. Abido	1036
Reliability Anal	urrence of a Realistic DC Line Fault Based on RTDS and Its Simulation lysis ngyin Li; Chengyong Zhao and Xiangning Xiao	1047
ICC Poster Ses	esion	
Chair: Sponsor:	TBD, tbd Insulated Conductors	
MV Cable Con	th Continuous Condition Monitoring of In-Service nections Yielen and E. Fred Steennis	1052
Operations Me	ethods and Techniques	
Chair: Sponsor:	Renato Cespedes, KEMA Power System Operations	
Arm Offshore F	ets on THD Values in Onshore Systems by a Natural Filter Feeder	1060

NERC IDC: Managing Congestion in the North American Eastern Interconnection Nelson Muller; Guillermo Irisarri; Jose Medina; Carlos Gonzalez-Perez; Mohamad Yassin; Jim Latimer; Farrokh Albuyeh and Sasan Mokhtari	Edward H. Chan; Peng Li and Ruipeng Zhang1069
Fransmission Expansion Planning Simon Ng; Jin Zhong and C. W. Lee	Nelson Muller; Guillermo Irisarri; Jose Medina; Carlos Gonzalez-Perez;
Romanian Power System Paul Sroica; Ion Merfu; Mihail Stroica; Marius Merfu and Aurel Campeanu	Transmission Expansion Planning
for Improvement Tobias Weissbach and Ernst Welfonder	Romanian Power System
Instability Criterion to Eliminate the Non-Detection Zone of the Sandia Frequency Shift Method Hatem Zeineldin and Scott Kennedy	for Improvement
A Tariff for Reactive Power Christopher Tufon; Alan Isemonger; Brendan Kirby; John Kueck and Fran Li	Instability Criterion to Eliminate the Non-Detection Zone of the Sandia Frequency
Christopher Tufon; Alan Isemonger; Brendan Kirby; John Kueck and Fran Li	
Yogendra Kumar; Kaustubh Dwivedi and Ganga Agnihotri	
Shunt Power Filter Adel Sharaf and Adel Elgammal	
Power System Planning and Implementation Poster Session Chair: M. L. Chan, Quanta Technology Sponsor: Power System Planning and Implementation Automatic Network Topology Generator for Transmission Planning ADrian Inda; Gustavo Bravo and Federico Flores	Shunt Power Filter
Chair: M. L. Chan, Quanta Technology Sponsor: Power System Planning and Implementation Automatic Network Topology Generator for Transmission Planning ADrian Inda; Gustavo Bravo and Federico Flores	
Sponsor: Power System Planning and Implementation Automatic Network Topology Generator for Transmission Planning ADrian Inda; Gustavo Bravo and Federico Flores	Power System Planning and Implementation Poster Session
ADrian Inda; Gustavo Bravo and Federico Flores	
Lines in China Daochun Huang; Jiangjun Ruan and Feng Huo	
A Modeling Paradigm for Extending Well-Being Analysis to a Composite Bilateral Contracts Market	Lines in China
Contracts Market	
11011 + 011111 1110 + 1349 + 0114 + 111111111111111111111111111111	

Autonomous Control of Energy Storage Devices for Enhancing Power System Stability Chung-Neng Huang11	56
Neural Network Based Approach for Short-Term Load Forecasting Mohamed Awad; Zainab H. Osman and Tawfik K. Mahmoud11	62
Backward Search Approach to Incorporate Excess Stream Inflows in SDP Based Reservoir Scheduling of Hydropower Plants	
Deependra Jha; Naoto Yorino; Yoshifumi Zoka; Yutaka Sasaki; Hayashi Yuki; Kazunoni Iwata and Ryuju Oe11	70
Special Protection Systems in Ontario Pedro Rebellon	.76
A Nonlinear Model for the Long-Term Hydro-Thermal Generation Scheduling Problem Over Multiple Areas with Transmission Constraints	
Leonardo Martins; Secundino Soares and Anibal Azevedo	82
Aggregation of Multiple Induction Motors using MATLAB-based Software Package Arif Karakas; Fangxing Li and Sarina Adhikari11	89
Reliability Evaluation of Composite Power Systems Using Parallel Genetic Algorithms: Some Conceptual and Simulation Studies Lingfeng Wang and Chanan Singh	195
Improving Performance of NN Based Electricity Price Forecasting Using Sensitivity Analysis Paras Mandal; Anurag Srivastava and Michael Negnevitsky	202
Clustering based Short Term Load Forecasting using Artificial Neural Network Amit Jain and B. Satish12	
Short and Medium Term Operation Planning in Electric Power Systems Roberto Navarro	17
Power Systems Relaying	
Chair: Miram Sanders, AMETEK Power Instruments Sponsor: Power System Relaying	
An Optimised Fault Classification Technique Based on Support-Vector-Machines Omar Youssef	225
Recent Developments in State Estimation with Phasor Measurements Arun Phadke; James Thorp; Reynaldo Nuqui and Ming Zhou	:33
Summary of the "Guide for the Protection of Shunt Reactors" IEEE Std. C37.109-2006 Kevin Stephan; Pratap Mysore; John Appleyard; Munnu Bajpai; Simon Chano; Arvind Chaudhary; Roger Hedding; Charles Henville; Dean Miller; Vittal Rebbapragada and James Stephens	240

Optimal Overcurrent Relays Coordination using Particle-Swarm-Optimization Algorithm Mohamad Reza Asadi and Shahram Montaser Kouhsari	1244
A Fault Location Algorithm Using Estimated Local Source Impedance Young-Jin Kwon; Dong-Gyu Lee and Su-Hwan Kim	1251
Distance Relays Ideal Tripping Characteristic in Presence of Directly Connected Load to Transmission Lines Hossein Shateri and Sadegh Jamali	1256
Adaptive Distance Relaying Scheme in Presence of UPFC using WAMS K. Seethalekshmi; Sri Niwas Singh and Suresh Srivastava	
An Asymmetrical Fault Location Method Based on Communication System in Distribution Network with DGs Jiao Du; Yuping Lu; Guofang Zhu and Xia Lin	1268
DWT and Bayesian Technique for Enhancing Earth Fault Protection in MV Networks Nagy Elkalashy; Matti Lehtonen and Naser Tarhuni	
Experimental Evaluation of Power Differential Relay for Transmission Line Protection Hatem Darwish; Abdel-Maksoud Taalab; Eman Ahmed and Om Malik	
Measured Impedance by Distance Relay for Inter Phase Faults in Presence of SSSC Sadegh Jamali; Ahad Kazemi and Hossein Shateri	1286
Using Fault Current Limiter to Minimize Effect of Thyristor Controlled Series Capacitor on Over Reach Problem of Distance Protection Seyed Ali Akbar Shahriari; Mohamad Hoasseini Abardeh; Ali Yazdian Varjani and Mostafa Mohamadian	1292
PMU Simulation and Application for Power System Stability Monitoring Harmeet Kang; Branislav Cvorovic; Chris Mycock; Damien Tholomier and Ruikun Mai	1298
Adaptive Protection of Transmission Lines During Wide Area Disturbances Damien Tholomier and Alexander Apostolov	1305
Analysis of Wide Area Events – Present and Future Alexander Apostolov and Benton Vandiver	1312
Measured Impedance by Distance Relay Elements Applied on a Distribution Feeder in a Single Phase to Ground Fault Hossein Shateri and Sadegh Jamali	1319
Effect of Current Sensor Technology on Distance Protection Ferry Viawan; Jianping Wang; Zhao Wang and Winnary-Ying Yang	1326
ANN-Based Protection System for Controllable Series-Compensated Transmission Lines Ahmed Hospy and Mohammed Safiuddin	1333

Presence of TCSO	ance by Distance Relay with Positive Sequence Voltage Memory in	
	degh Jamali and Hossein Shateri	1339
PSACE Forum 1	l	
Chair: Sponsor:	Kevin Schneider, Pacific Northwest National Laboratory Power System Analysis, Computing, and Economics	
Limitations of Co	Swarm Optimization Based Reliable Algorithm to Overcome the onventional Power Flow Methods and Swapan Goswami	1345
	amic Voltage Stabilization based on Model Predictive Control Ratnesh Kumar	1352
	alytical Hierarchy Process in Contingency Ranking Mehdi Ehsan; Zeinab Ghofrani Jahromi and Mohsen Masjed Jamei	1360
	Component Algorithm (PHCA) for Power System Identification g Xie and Qirong Jiang	1366
Under Uncertaint		
	ur; Mohsen Parsa Moghaddam; Mahmoud-Reza Haghifam and usefi	1371
	via Manifold Regularization g Dai; Guixiang Zhai; Yijia Cao and Zhaoyan Liu	1381
Determine Possib	e HHI in a Probabilistic Framework for a Parametric Approach to le Market Power I.W. Corley and Bei Gou	1387
Ebrahim Shayeste	nt Using Emergency Demand Response Program eh; Ashkan Yousefi; Mohsen Parsa Moghaddam and Mohammad L-Eslami	1395
	Analysis of Data from Hydroelectric Plants cundino Soares; Darrell Fontane and Marcelo Cicogna	1402
Simple Method fo Cassio Fujisawa	or Computing Power Systems Maximum Loading Conditions and Carlos Castro	1408
Based on WAMS	ion of Transfer Function Identification for Power System 1 Jiang and Yijia Cao	1414
Multiple Scale Id Huang Transform	entification of Power System Oscillations Using an Improved Hilbert-	

	tional Marginal Pricing in Deregulated Power Markets gwat and Parviz Rastgoufard
PSC Poster Sess	ion
Chair: Sponsor:	TBD, TBD Power System Communications
Muhammad Zees	Grid Based Render Farm for Blender 3D han Patoli; Michael Gkion; Abdullah Al-Barakati; Wei Zhang; d Martin White
PSIM Posters	
Chair: Sponsor:	Rejean Arseneau, NRC Canada Power System Instrumentation and Measurements
	imation Methods in Power Systems r; Madeleine Gibescu and Lou van der Sluis
Hilbert-Huang Tr	teristic Analysis of Power System Low Frequency Oscillation Using ransform un; Cheng Wu and Li-quan He
	ne and Transformer Parameter Estimation adres Olarte and Hernando Diaz
Smart Grid Con	trol
Chair: Sponsor:	TBD, TBD Power System Communications
	on to Optimal Load Shedding in a Micro-Grid J. K. Nelson
	er Smart Grid Through Better Renewable Energy Information Allison Archambault and Kenneth Westrick
	n for Efficient and Flexible Power Networks Operation and Control
Stationary Batte	ery Poster Session
Chair: Sponsor:	TBD, TBD Stationary Battery
Distribution Grid	rging of Multiple Plug-In Hybrid Electric Vehicles in Residential s ; Edwin Haesen and Johan Driesen

Chair: TBD, TBD Surge Protective Devices Sponsor: Palm Kernel Oil Cake as an Alternative to Earth Resistance-Reducing Agent Fault Current Limiter – R&D Status and Testing Issues **Switchgear Committee Poster Session** Chair: TBD, TBD Sponsor: Switchgear Use Vibration Monitoring to Identify Circuit Breakers for Condition Assessment Zhenyuan Wang 1498 Computer Aided Optimized Design, Simulation and Comparison of Synthetic Test Circuits For 420 kV Rating Circuit Breakers Evaluation of AC Contactor's Dynamic Characteristics Using Fuzzy Techniques Multi-Objective Evaluation for Distribution Network Reconstruction Basing on Hierarchical Data Envelopment Analysis **T&D Poster Session** Prof. Joydeep Mitra, Michigan State University Chair: Transmission and Distribution Sponsor: The Implementation of Fuzzy Adaptive PI Controller in VSC-HVDC Systems Condition Based Failure Rate Modeling for Electric Network Components Three-Phase Short-Circuit Fault on the Lower Frequency Bus of Cycloconverter in FFTS The Calculation of Main Circuit Steady State Parameters for HVDC System Determination of VFTO Waveform in GIS According to Simplified Structure of GIS Bus and Circuit Parameters

Surge Protective Devices Poster Session

The Wavelet Tra	Fault Detection in EHV Series Compensated Lines Using nsform lin; Doaa Khalil Ibrahim; Essam Aboul-Zahab and Saber Mohamed	
	Soul Financia Committee Commit	1550
Power Quality A	Vindowed Fourier Transform and Dynamic Phasors for nalysis Efrain O'Neill-Carrillo	1560
		1300
Homogeneous So Wan Fatinhaman	nah Wan Ahmad; David W. P. Thomas; Christos Christopoulos;	
Say Tat Chong; J	asronita Jasni; Mohd. Zainal A. Ab Kadir and Hashim Hizam	1565
N. Golovanov, G	ess to the Romanian Transport System .C. Lazaroiu, M.A. Manole, M. Roscia, and	1570
	provement Roadmap Based on a Predictive Model and	
Julio Romero Ag	uero; Richard Brown; John Spare; Edmund Phillips; Le Xu	1576
Probabilistic Neu	assification of Power Quality Disturbances Using S-Transform and rral Network	1584
Analysis and Co	ontrol of Sustainable Energy Systems	
Chair: Sponsor:	Wenzhong Gao, Tennessee Technological University Energy Development and Power Generation	
	sed Method for Optimal Location of Dispersed Generation Units hi and Ahad Kazemi	1585
	on Energy Use and Carbon Dioxide Emission Patterns and Pat Bodger	1590
Liberalized Mark		
Mohamed El-Say	/ed	1598
	sis of Hysteresis Controlled Grid-Connected Inverters and Constantine Hatziadoniu	1605
	f Green Buildings Using Natural Daylight in Lin and Wei-Jen Lee	1613
	ods for Radial and Weakly-Meshed Networks: Concept of Duality Dharmasa; H.S. Jain and Prayeen Reddy	1620

Emerging Technologies

Chair: Sponsor:	Miroslav Begovic, Georgia Tech Emerging Technologies Coordinating	
-		
	Systems in a Distributed Smart Grid: Design and Implementation anasomporn; Hassan Feroze and Saifur Rahman	1629
Cell Power Pl		
Mohamed El-	Sharkh; A. Rahman; M. Alam and A. A. El-Keib	1637
	l-Constrained Power Plant and NaS Battery System for Profit Increment in Electricity Market	
	npour; Majid Hosseinpour; Mohsen Parsa Moghaddam Reza Yousefi	1643
	tability of Power Inverters Feeding Renewable Power to Weak AC Grids ow Mechanical Inertia	
Walter Kuehn		1652
	Nonlinear Excitation Control Based on Wide-Area Measurements gzeng Wang; Quanyuan Jiang and Yijia Cao	1660
Communication	eeking energy efficiency using Information and on Technologies? uric; Nadia Maizi; Alain Anglade and Gilles Guerassimoff	1665
NSF Career A	Awards: Experiences in Research & Education	
Chair: Sponsor:	Dagmar Niebur, National Science Foundation Power Engineering Education	
Power Quality Today's Energ	Research and Education: A New Power Engineer for gy Challenges	
Efrain O'Neill	-Carrillo	1669
	Science Foundation and Its Quest for Tomorrow's Academic Leaders	1670
	F CAREER Award and Beyond r Venayagamoorthy	1671
For What It's ' CAREER Pro	Worth: My Advice to Young Investigators on Preparation of an NSF-	
Michael Ropp)	1672
A Novel Hybi Fuel Cell Inve	rid Modulation Scheme for an Isolated High-Frequency-Link	
	der	1673

Power System Communications #1 TBD, TBD Chair: Sponsor: **Power System Communications** Analysis of Effect of Power line Channel Characteristic Parameters in Broadband Power Line Communication (BPLC) Systems Vulnerability Assessment for Communication Network of Substation Automation Systems to Cyber Attack Communication Protocols and Networks for Power Systems- Current Status and **Future Trends Power System Communications #2** Chair: TBD, TBD Sponsor: **Power System Communications** How to Evaluate and Deploy the Latest Advancements in Communication Networks Gateway Platform for Connecting D-TRS in Power IT Tae Eui Jeong; Byung Kwen Song; Jincheol Kim; Youngeok Kim; Taeku Kang and **PSACE Forum 2** Chair: Roger Dugan, EPRI Sponsor: Power System Analysis, Computing, and Economics Analysis Method of Voltage Stability for Bulk Power System by P-V and Q-V Curves Considering Dynamic Load A New Reactive Power Valuation Method Based On Analytic Hierarchical Process Feedback-Control-Based Optimal Power Flow for Real-Time Operation Utility-Owned DG Units' Impacts on Distribution System Operation

Reliable Placement of Synchronized Phasor Measurements on Network Branches

	ichard O'Neill and Shmuel Oren	1737
	lation of Power Systems using Real-time Digital Simulator kumar; Noel Schulz and Anurag Srivastava	1743
	Detection of Electricity Customer Behaviour Irregularities Zhao Dong	1749
Constraints in De	riate Bidding Strategies under Uncertain Conditions and Security regulated Power Markets Γorghabeh and Hamid Khaloozadeh	1759
JJ Dai; Hugo Cas	ation Control System for an Industrial Facility with Onsite Generation tro; Jianjun Guo; Tanuj Khandelwal; Shervin Shokooh	1765
	e, Var Control and Demand Response in Distribution Systems hevich and Edward H. P. Chan	1773
Unit Asset Valuat	lynomial Approximation for Short-Term Generation tion ljo; A. A. El-Keib and M. Alam	1777
an Underground I	n and Analysis of Incipient Faults Leading to a Catastrophic Failure in Distribution Feeder rrasoul Mousavi; James Stoupis and John McGowan	1783
Substation Auto	mation, Monitoring and Transformer Noise	
Chair: Sponsor:	Hermann Koch, Siemens AG Substations	
Pseudo-Inverse	Optimal Transformer Noise Levels in Outdoor Substations Using Daiki Yamashita; Tak Niimura and Ryuichi Yokoyama	1789
	Outy Monitoring from the Control Center and A. P. Meliopoulos	1795
	ntegration and Utilization ka; Mladen Kezunovic and Tomo Popovic	1801
Substation Autom	rediction Framework for Protection and Control Applications in nation ean-Charles Tournier; Thomas Werner and Stefan Richter	1807
for Interoperabilit	50 Based Multi-vendor Substation Automation Systems ty Tan; Vincent Green and John Ciufo	1815

System Econo	omics 1
Chair:	Xiaoming Feng, ABB
Co-Chair:	Kankar Bhattacharya, University of Waterloo
Sponsor:	Power System Analysis, Computing, and Economics
	Maintenance Scheduling of a Power Prouducer under Price Uncertainty
Changyou Fer	ng; Xifan Wang and Haoyong Chen18
	Allocation of Generation in Autonomous Power Networks
Jasper Frunt; \	W. L. Kling and J. M. A. Myrzik183
	e Algorithm for Optimal Unit Scheduling of Thermal Units
Sun-Nien Yu.	
A Literature S	Survey of Optimal Power Flow Problem in Electricity Market Context
Zhifeng Qiu; (Geert Deconinck and Ronnie Belmans
Analytical M	ethods 2
Chair:	Edwin Liu, Quanta Technology
Sponsor:	Power System Analysis, Computing, and Economics
	ansform Approach to Adaptive Extraction of Partial Discharge Pulses
from Interfere	
Zhousheng Zh	nang; Dengming Xiao and Yilu Liu
	rformance of WFA K-Means and Modified Follow the Leader Methods for
Clustering Loa Nadali Mahm	ad Curves oudi Kohan; Mohsen Parsa Moghaddam and Seyed Mohamad Bidaki185
Dunamia Saay	urity Assessment Using Time-Domain Simulator
	Grega Bizjak; Edwin Lerch; Olaf Ruhle and Rainer Krebs
A Pobjet Alge	orithm for Volt/Var Control
	and Aleksander Stankovic
Distributed G	Generation Control #1
Cl	TBD, TBD
(nair	Power System Communications
Chair: Sponsor:	
Sponsor:	spatch using Particle Swarm Optimization for Combined Cycle Generators

Distributed Generation Control #2

Chair: Sponsor:	TBD, TBD Power System Communications	
Egon Ortjohann;	logy of Distributed Generation in Interconnected Grids Worpong Sinsukthavorn; Alaa Mohd; M. Lingemann; N. Hamsic; Danny Morton	1893
Farm-Scale Anae	of Standard SCADA Protocols to the Reliable Operation of Distributed robic Digesters	1899
and Battery Stora	low for a System of Microgrids with Controllable Loads ge nd Mohamed El-Sharkawi	1905
Distribution Sys	tem Analysis 1	
Chair: Sponsor:	Jean-Sébastien Lacroix, CYME International T&D Power System Analysis, Computing, and Economics	
Incorporating Dis	ility Evaluation of Distribution and Sub-Transmission Systems stributed Generation le; Carmen Borges and Djalma Falcão	1910
Ivo Chaves da Si	tructive Algorithm for Capacitor Placement on Distribution Systems lva Jr; Sandoval Carneiro Jr; Edimar Jose Oliveira; a Costa; Jose Luiz R. Pereira and Paulo Augusto N. Garcia	1916
	rdinal Optimization for Distribution System Reconfiguration	1917
	Load and Generation Composition in Distribution Grids and Lutz Hofmann	1925
Voltage Profile	eration of Distributed Generations in Distribution Systems for Improved and Selvan M. P.	1932
Protection Schem	Mitigate the Impact of Distributed Generation on the Overcurrent are for Radial Feeders of and Karen Butler-Purry	1939

FACTS/Power Electronics Applications to Improve Power System Dynamic Performance

John J. Paserba, Mitsubishi Electric Power Products, Inc. Chair: Power System Dynamic Performance Sponsor: Historical Overview on Dynamic Reactive Power Compensation Solutions from the Begin of AC Power Transmission Towards Present Applications Heinz Tyll and Frank Schettler 1950 Bayamon SVC Project in Puerto Rico Managing Fault-Induced Delayed Voltage Recovery in Metro Atlanta with the Barrow County SVC Daniel Sullivan; Ron Pape; Joe Birsa; Mike Riggle; Masatoshi Takeda; Hitoshi Teramoto; Yoshiyuki Kono; Koji Temma; Satoshi Yasuda; Ken Wofford; Paul Attaway Preventing Voltage Collapse by Large SVCs at Power System Faults Ahmed Al-Mubarak; Saleh M. Bamsak; Bjorn Thorvaldsson; Mikael Halonen Dynamic Performance of the Next Generation Synchronous Condenser at VELCO Paul Marken; Dean LaForest; Rob D'Aquila; Dan Wallace; Erik Kronbeck **System Economics 2** Eugene Litvinov, ISO New England Chair: Co-Chair: Avnaesh Jayantilal, AREVA T&D Power System Analysis, Computing, and Economics Sponsor: On Reducing Uplift Payment in Electricity Markets Bingjie Zhang; Peter Luh; Eugene Litvinov; Tongxin Zheng and Feng Zhao1981 Scenario Generation for Price Forecasting in Restructured Wholesale Power Markets Post-Market Determination of the Real-Time Market Commitment Types for Settlement Dingguo Chen and Bixia Zhou 1996 Method to Detect and Measure Potential Market Power on Electricity Markets using the Concept of Monopolistic Energy **Transformers** Chair: Tom Prevost, Weidmann Diagonstics Solutions Sponsor: Transformers Experimental Verification of Distribution Transformer Model under Lightning Strokes

	timation of Power Transformer Using Oil UV-Vis Spectral Response la; lai Sin Pin and Syed Islam	2017
	ner DGA Data Processing and Alarming Tool for On-line Monitors nenyuan Wang and Yilu Liu	2022
Wide Area Mea	surements and Generators	
Chair: Co-Chair: Sponsor:	Jeff Smith, EPRI Pouyan Pourbeik, EPRI Power System Dynamic Performance	
	ations Damping using Dynamic Braking and Phasor Measurements c; Igor Kuzle and Tomislav Tomisa	2030
Jingyuan Dong;	urements of Three North America Interconnections at Distribution Leve Γαο Xia; Yingchen Zhang; Lei Wang; Yilu Liu; Lisa Beard	
Wei Li; Robert C	hronized Measurements and Inter-Area Oscillation Study Gardner; Jingyuan Dong; Lei Wang; Tao Xia; Yingchen Zhang; Zhang and Yusheng Xue	2044
	oroach to Control Frequency Instabilities in a Wide Area System -Barijough; Meisam Mashhuri and Ali M. Ranjbar	2052
Eigenvalue Sensi	ing Controllers for Doubly Fed Induction Generators Using itivities d Luis Rouco	2058
with NERC's Sta	Immune Based Automatic Generation Control Design in Compliance ndards and Ali Feliachi	2065
Generation Syste	ion of Ziegler-Nichols Method to AGC of Distributed om . Mishra and A.N. Jha	2072
Author Index		