



Power Systems Engineering Research Center

Researcher Profiles

Updated November 2006

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Statement of Research Interests:

Power system state estimation, network observability, optimal meter placement, computer modeling and simulation of electromagnetic transients; electric power quality, fault location using wavelet transform and traveling waves, multi-phase distribution system optimal capacitor placement, visualization methods for power system monitoring.

Listed Keywords Describing Research Interests:

1. Circuits and systems
2. Computational techniques and simulation
3. Computer applications
4. Computer simulation
5. Computer modeling
6. EMTP applications and modeling
7. Fault analysis
8. Graphics and visualization
9. Optimization
10. Power quality
11. Power system analysis
12. Security assessment
13. State estimation

Selected Publications:

1. Zhong, S. and Abur, A., "Combined State Estimation and Measurement Calibration," IEEE Trans. on Power Systems, Vol.20, No.1, February 2005, pp.458-465.
2. Zhong, S. and Abur, A., "Auto Tuning of Measurement Weights in WLS State Estimation," IEEE Trans. on Power Systems, Vol. 19, No. 4, Nov. 2004, pp. 2006-2013.
3. Ding, Q. and Abur, A., "Transmission Loss Allocation in a Multiple-Transaction Framework," IEEE Trans. on Power Systems, Vol. 19, No. 1, Feb. 2004, pp.214-220.
4. Galijasevic, Z. and Abur, A., "Fault Location Using Voltage Measurements," IEEE Trans. on Power Delivery, Vol.17, No.2, April 2002, pp.441-445.
5. Gou Bei and Abur, A., "An Improved Measurement Placement Algorithm for Network Observability," IEEE Trans. on Power Systems, Vol.16, No.4, November 2001, pp.819-824.

Selected Research Projects:

1. Optimal Placement of Phasor Measurement Units
2. Enhanced State Estimators
3. Multi-Area State Estimation in Restructured Power Systems
4. Importance Based Visualization of Energy Networks via Progressive Simplification
5. Mega grid Transfer Capability Calculations

Principal Research Stem Areas of Interest:

1. T&D technologies
2. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. State estimation
2. Computational techniques and simulation
3. EMTP applications and modeling
4. Fault analysis
5. Power system analysis

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Computational techniques
2. Computer simulation
3. Matlab for power engineers

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Statement of Research Interests:

My primary research interests are in the design of Monte Carlo variance reduction methods and system reliability evaluation. I have several publications on the evaluation of performability measures for transportation, distribution, and communications systems. I focus on methods based on an iterative partition of the system state space. Such methods yield progressively tighter lower and upper bounds and either terminate with the exact value or stop when the bounds are reasonably tight. In the latter case, one can apply a combination of importance and stratified sampling to compute precise estimates with computational effort that is miniscule compared to the effort required by the standard Monte Carlo method. I have also developed efficient simulation techniques for estimating performance measures of highly reliable, repairable systems.

Listed Keywords Describing Research Interests:

1. Computer simulation
2. Computer modeling
3. Reliability

Selected Publications:

1. Alexopoulos, C. and Jacobson, J. A., "State Space Partitioning Algorithms for Stochastic Systems, with Applications to Minimum Spanning Trees," Networks, vol. 35, no. 2, pp. 118-138, 2000.
2. Alexopoulos, C. and Shultes, B. C., "Estimating Reliability Measures of Highly-dependable Markovian Systems Using Balanced Likelihood Ratios," forthcoming in special issue of IEEE Transactions on Reliability "Recent Advances in Simulation Methodology for Highly Reliable Systems", 2000.

Selected Research Projects:

1. *A Class of Methods for Analyzing Stochastic Systems*, Air Force Office of Scientific Research, (11/1/92-9/31/95).

Principal Research Stem Areas of Interest:

1. Systems
2. Markets

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Computer simulation
2. System reliability

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Statement of Research Interests:

1. Dynamic interactions between markets and power systems.
2. Design of markets that properly take into consideration the system reliability in the design of the market and its rules.
3. Methods for translating system limits into market signals.
4. Methods for assessing and managing risk in electricity spot markets
5. Methods for designing demand management contracts based on game theory
6. Methods for the measurements and characterization of ancillary services according to time frame, particularly the use of frequency-spectrum techniques for characterizing reactive power response and system reserves.
7. Method for measuring market power, particularly market power that arises from reactive power concerns.
8. Methods for sparsity preservation in orthogonal state estimation, particularly situations with dense rows, and other efficiency issues in large scale computation

Listed Keywords Describing Research Interests:

1. Congestion management
2. Economics
3. Pricing
4. Computational techniques and simulation
5. Deregulation policies
6. Policy analysis
7. State estimation
8. Available transfer capability
9. Auctions
10. Ancillary services
11. Reliability
12. Symbolically-assisted numeric computation
13. Electricity trading

Selected Publications:

1. F. L. Alvarado, "The Stability of Power System Markets," IEEE Transactions on Power Systems, Vol. 14, No. 2, May 1999, pp. 505-511.
2. R. Rajaraman and F. L. Alvarado, "Inefficiencies of NERC's Transmission Loading Relief Procedures," The Electricity Journal, October 1998, pp. 47-54.
3. H. Glavitsch and F. L. Alvarado, "Management of multiple congested conditions in unbundled operation of a power system," IEEE Transactions on Power Systems, August 1998.
4. F. L. Alvarado and W. F. Tinney and M. K. Enns, "Sparsity in Large-Scale Network Computation," in "Advances in Electric Power and Energy Conversion System Dynamics and Control," C. T. Leondes (editor), Academic Press 1991, "Control and Dynamic Systems," Volume 41, pp. 207—272, Part 1.

5. F. L. Alvarado, "Penalty Factors from Newton's Method," IEEE Transactions on Power Apparatus and Systems, Vol. PAS-97, Nov/Dec 1978, pp. 2031-2040.

Selected Research Projects:

2. Converting technical limits to price signals (nomograms)
3. The stability of market/system interactions

Principal Research Stem Areas of Interest:

3. Markets
4. Systems
5. T&D technologies

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Congestion management
2. Economics
3. Pricing
4. Computational techniques and simulation
5. Deregulation
6. Policy analysis
7. State estimation

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Statement of Research Interests:

Application of microcomputers and other advanced technologies to monitoring, protection, and control of transmission and distribution systems. Specific areas of interest and significant past effort include characterization and detection of high-impedance, arcing faults; and real-time monitoring to detect and classify precursors to failures of various distribution apparatus.

Listed Keywords Describing Research Interests:

1. Signal processing
2. Distribution automation
3. Intelligent systems

Additional Keywords Describing Research Interests:

1. Arcing fault detection
2. Fault anticipation
3. Signature analysis

Selected Publications:

1. *Distribution Fault Anticipator, Phase I: Proof of Concept*, Final Report prepared for the Electric Power Research Institute (EPRI), Palo Alto, California, EPRI Publication #1001879, December 2001, 120 pp.
2. Carl L. Benner and B. Don Russell, "Investigation of Incipient Conditions Leading to the Failure of Distribution System Apparatus," *Proceedings of the IEEE/PES Power Systems Conference and Exposition*, New York, New York, October 10-13, 2004, 6 pp.
3. Chris S. Richards, Carl L. Benner, Karen L. Butler-Purry, and B. Don Russell, "Electrical Behavior of Contaminated Distribution Insulators Exposed to Natural Wetting," *IEEE Transactions on Power Delivery*, Vol. 18, No. 2, April 2003, pp. 551-558.
4. B. Don Russell and Carl L. Benner, "Performance of High Impedance Fault Detection Algorithms in Long Term Field Trials," *Electric Power System Research*, Vol. 31, No. 2, November 1994, pp. 71-77.
5. Carl L. Benner and B. Don Russell, "Practical High Impedance Fault Detection for Distribution Feeders," *IEEE Transactions on Industry Applications*, Vol. 33, No. 3, May/June 1997, pp. 635-640.

Selected Research Projects:

1. Distribution Fault Anticipation
2. Increased Electricity Supply through Real-Time Power System Monitoring and Control
3. Power Distribution Failure Prediction

4. Reliability Based Vegetation Management Through Intelligent System Monitoring
5. Characterization and Detection of Low Current Faults on Low Voltage Networks

Principal Research Stem Areas of Interest:

1. T&D technologies
2. Systems

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Statement of Research Interests:

Advances in the theory and application of uncertainty. We are currently investigating the DEnv algorithm (Distribution Envelope determination), which is a technique for computing envelopes around the CDF of a random variable whose samples are a function of the samples of other random variables. DEnv can produce envelopes with important guarantees when the input random variables have unknown dependency and when their CDFs are themselves uncertain. We are applying this to problems in electric power, with an emphasis on issues arising in the deregulated marketplace including bidding, market power, market interaction, contract evaluation and selection, and decision analysis.

Listed Keywords Describing Research Interests:

1. Probability analysis
2. Decision analysis
3. Software engineering

Additional Keywords Describing Research Interests:

1. Text mining
2. Uncertainty quantification
3. Curriculum integration

Selected Publications:

1. "[Using correlation to improve envelopes around derived distributions](#)," accepted 11/7/02 pending revisions.
2. "[Representation and Problem Solving with the Distribution Envelope Determination \(DEnv\) Method](#)," accepted pending revisions 11/02.
3. D. Berleant, J. Zhang, R. Hu, and G. Sheblé, [Economic dispatch: applying the interval-based distribution envelope algorithm to an electric power problem](#), SIAM Workshop on Validated Computing 2002 Extended Abstracts, Toronto, May 23-25, pp. 32-35.
4. D. Berleant, L. Xie, J. Zhang, and G. Sheblé, [An improved tool for distribution envelope determination, a technique for interval-based, verified arithmetic on random variables](#), SIAM Workshop on Validated Computing 2002 Extended Abstracts, Toronto, May 23-25, pp. 26-31.
5. G. Sheblé and D. Berleant, [Bounding the composite value at risk for energy service company operation with DEnv, an interval-based algorithm](#), SIAM Workshop on Validated Computing 2002, Extended Abstracts, Toronto, May 23-25, pp. 166-171.

Selected Research Projects:

1. "Market Interactions and Market Power."
2. "Bioinformatic Tools for Extraction and Modeling of Signal Transduction Pathways."
3. "EPICS at Iowa State University: Assistive Technology for Disabled Children."

Principal Research Stem Areas of Interest:

1. Markets

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Artificial intelligence
2. Probability analysis
3. Decision analysis
4. Intelligent systems

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Uncertainty
2. Finance

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Statement of Research Interests:

Power system operation and control; power grid control centers; computer applications to power systems

Listed Keywords Describing Research Interests:

1. Operations
2. Computer simulation
3. Security assessment

Selected Publications:

1. Feasibility of a Bilateral Market for Load Following,” (with E. Nobile and K. Tomsovic), IEEE Transactions in Power Systems, vol. 16, No. 4, pp. 782-787, November 2001.
2. “A Fast Voltage Security Assessment Method Using Adaptive Bounding,” (with H. Liu and V. Venkatasubramanian), IEEE Transactions in Power Systems, vol. 15, No.3, pp.1137-1141, August 2000.
3. “Transmission Capacity in Power Networks,” (with M. Ilic, F. Galiana, L. Fink, P. Mallet and H. Othman), Electrical Power & Energy Systems, vol.20, No.2, pp.99-110, February 1998.
4. “Feasibility Study of Transient Stability Analysis for Operator Training Simulators,” (with R.S. Kuruneru), IEE Proceedings - Generation, Transmission and Distribution, vol.144, No. 5, pp. 510-514, September 1997.
5. “Severity Indices for Contingency Screening in Dynamic Security Assessment,” (with V. Brandwajn, A.B.R. Kumar, A. Ipakchi and S.D. Kuo), IEEE Transactions in Power Systems, vol. 12, No. 3, pp. 1136-1142, August 1997.

Selected Research Projects:

1. Industrial Applications of Information Security to Protect the Electric Power Infrastructure
2. Advanced Real Time Measurement and Controls
3. On-Line Dynamic Security Analysis of Power Systems

Principal Research Stem Areas of Interest:

1. Systems

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Statement of Research Interests:

My research interests are two-fold. One area is the integration of distributed technologies into both electric power system operations and the emerging competitive electricity markets. As competition increases, access to system data and information decreases, as does willing participation in a centrally operated system and market. These trends highlight the need for the investigation of alternative operation and control strategies that will effectively integrate technologies into the increasingly competitive and decentralized power system. A second, related area of interest is the ongoing market design for electricity, ancillary services and transmission products, including analyses of existing and potential strategic behavior that exploits the dynamic characteristics of the power system.

Listed Keywords Describing Research Interests:

1. Distributed resources
2. Market design
3. Markets
4. Complex systems
5. Computer simulation
6. Computer modeling
7. Auctions
8. Bidding
9. Pricing
10. Game theory
11. Economics
12. Restructuring policies
13. Policy analysis
14. Renewable energy
15. MicroGrids
16. Control theory
17. Stability

Selected Publications:

1. Cardell, J. B., M. D. Ilic, "Maintaining Stability with Distributed Generation in a Restructured Industry," IEEE Power Engineering Society General Meeting, Denver CO, June 2004.
2. Cardell, J., "Improved Marginal Loss Calculations During Hours of Transmission Congestion," Hawaii International Conference on System Sciences, Hilton Waikoloa Village, Big Island, Hawaii, January, 2005.
3. Cardell, J. B., M. D. Ilic, "The Control and Operation of Distributed Generation in a Competitive Electric Market," in Power Systems Restructuring: Engineering and Economics, ed. M. Ilic, et. al., Kluwer Academic Publishers, June, 1998.

4. Cardell, J. B., C. Cullen-Hitt and W. W. Hogan, "Market Power and Strategic Interaction in Electricity Networks," Resource and Energy Economics, January, 1997.
5. Cardell, J. B., S. R. Connors, "Windpower in New England: Modeling and Analysis of Non-Dispatchable Renewable Energy Technologies," IEEE Transactions on Power Systems, Volume 13, Number 2, May 1998.

Selected Research Projects:

1. "*Improved reliability and congestion management with closed-loop control strategies for FACTS devices*"
2. "*Educating 21st Century Power Engineers*"
3. "*Agent Modeling For Integrated Power System, Power and Fuel Market Simulation*" (PSERC project)
4. Order 2000 (RTO Order) team member while on staff at the Federal Energy Regulatory Commission
5. Study for the Pacific Northwest electric utilities to analyze the regional impacts of combining the transmission system operations of all regional utilities into one regional operator.

Principal Research Stem Areas of Interest:

1. Markets
2. T & D technologies
3. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Market design
2. Markets
3. Pricing
4. Restructuring policies
5. Deregulation policies

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Statement of Research Interests:

My research interests include electricity pricing and risk management applications, market mechanism for energy asset investment, transmission pricing in electric power systems, financial asset pricing and real options valuation, stochastic modeling and simulation.

Listed Keywords Describing Research Interests:

1. Pricing
2. Electricity trading
3. Risk management
4. Options
5. Economics
6. Market design
7. Auctions
8. Congestion management
9. Economic dispatch
10. Transmission
11. Reliability
12. Unit commitment
13. Game theory
14. Simulation
15. Probability analysis
16. Simulation

Additional Keywords Describing Research Interests:

1. Real options
2. Demand response program design
3. Hedging load risks

Selected Publications:

1. "The Inherent Inefficiency of Simultaneously Feasible Financial Transmission Rights Auctions", joint with Shmuel Oren, Sakis Meliopoulos, *Proceedings of the Thirty-Seventh Hawaii International Conference on System Sciences*, Hawaii, January, 2004.
2. "Valuation of Investment and the Opportunity to Invest in Power Generation Assets with Spikes in Power Prices", *Managerial Finance*, 31(6), 2005.
3. "Electricity Derivatives and Risk Management," joint with Shmuel Oren, *Energy, the International Journal*, forthcoming, 2005.
4. "Exotic Electricity Options and the Valuation of Electricity Generation and Transmission Assets," joint with Blake Johnson, Aram Sogomonian, *Decision Support Systems*, (30)3, pp.383-392, 2001.

5. "Priority Network Access Pricing for Electric Power," joint with Shmuel Oren, *Journal of Regulatory Economics*, 19(3) July: 239-270, 2001.

Selected Research Projects:

1. Modeling market signals for transmission asset valuation.
2. Integrating engineering and economic modeling in deregulated electricity networks.
3. Evaluation of alternative market structure and compensation schemes for incenting transmission reliability and adequacy related investments.

Principal Research Stem Areas of Interest:

1. Markets
2. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Pricing
2. Electricity trading
3. Risk management
4. Options
5. Economics
6. Market design
7. Auction
8. Congestion management
9. Economic dispatch
10. Unit commitment
11. Game theory

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Demand response program design
2. Real options valuation of power asset investments

Ian Dobson

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Statement of Research Interests:

1. Cascading failure, blackout risk analysis, complex and self-organized behavior in power system blackouts. Advancing ideas and methods for this topic is Dobson's top priority.
2. Power system oscillations and modal interactions, interarea and subsynchronous oscillations
3. Transfer capability and stability limits, including computing margins, sensitivity of margins, and voltage collapse.
4. Power electronics, particularly TCSC stability and sigma-delta modulation.
5. Nonlinear dynamics, bifurcations, complex systems and hybrid systems
6. Computational methods and simulation.
7. For more information see <http://eceserv0.ece.wisc.edu/~dobson/home.html>

Listed Keywords Describing Research Interests:

1. Available transfer capability
2. Circuits and systems
3. Complex systems
4. Computational techniques and simulation
5. Control theory
6. Dynamics
7. Infrastructure protection
8. Nonlinear systems
9. Oscillations
10. Outage management
11. Probability analysis
12. Power electronics
13. Stability
14. Systems
15. Voltage collapse
16. Risk assessment
17. Reliability

Additional Keywords Describing Research Interests:

1. Cascading failure
2. Self-organized criticality
3. Blackouts

Selected Publications:

(available at <http://eceserv0.ece.wisc.edu/~dobson/home.html>):

1. I. Dobson, B.A. Carreras, D.E. Newman, A loading-dependent model of probabilistic cascading failure, *Probability in the Engineering and Informational Sciences*, vol. 19, no. 1, 2005, pp. 15-32.

2. B.A. Carreras, D.E. Newman, I. Dobson, A.B. Poole, Evidence for self organized criticality in electric power system blackouts, IEEE Transactions on Circuits and Systems I, vol. 51, no. 9, September 2004, pp. 1733-1740.
3. B.A. Carreras, V.E. Lynch, I. Dobson, D.E. Newman, Critical points and transitions in an electric power transmission model for cascading failure blackouts, Chaos, vol 12, no 4, December 2002, pp 985-994.
4. B.A. Carreras, V.E. Lynch, I. Dobson, D.E. Newman, Complex dynamics of blackouts in power transmission systems, Chaos, vol. 14, no. 3, September 2004, pp. 643-652.
5. J. Chen, J.S. Thorp, I. Dobson, Cascading dynamics and mitigation assessment in power system disturbances via a hidden failure model, to appear in International Journal of Electrical Power and Energy Systems, 2005.

Selected Research Projects:

1. Complex systems approach to cascading failures, PSerc CERTS project.
2. Limitations and interactions of bulk power transfers in large scale electric power systems, PSerc project funded by NSF.
3. Avoiding and suppressing oscillations in electric power systems; completed PSerc IAB project

Principal Research Stem Areas of Interest:

1. Systems

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Blackout risk and cascading failure

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Statement of Research Interests:

1. Dynamic interaction of turbine-generators and extra high voltage (EHV) power Systems
2. Static and dynamic power system analysis

Listed Keywords Describing Research Interests:

1. Oscillations
2. Power system analysis
3. Stability
4. Transient stability

Additional Keywords Describing Research Interests:

1. Subsynchronous resonance

Selected Publications:

1. R. G. Farmer, P.M. Anderson, Series Compensation of Power systems, 1996, PBLSH, Inc., Encinitas, CA.
2. R. G. Farmer, B.L. Agrawal, Power System Dynamic Interaction with Turbine-Generators, an article included in Electric Power Engineering Handbook, 2000, CRC Press, Boca Raton, FL.
3. R.G. Farmer, Subsynchronous Resonance, an article included in McGraw-Hill Encyclopedia of Science and technology, 2000, McGraw-Hill, New York, NY.
4. R.G. Farmer, J.D. McCalley, A.A. Fouad, V. Vittal, A.A. Irizarry-Rivera, B.L. Agrawal, A Risk Based Security Index for Determining Operating Limits in Stability-Limited Electric Power Systems, IEEE Transactions on Power Systems, Vol. 12, No. 3, August 1997.
5. R.G. Farmer, R.S.Weissbach, G.G. Karady, A Combined Uninterruptible Power Supply and Dynamic Voltage Compensator Using a Flywheel Energy Storage System, IEEE Transactions on Power delivery, Vol. 16, No. 2, April 2001.

Principal Research Stem Areas of Interest:

1. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Power system analysis
2. Stability
3. Transient stability

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Subsynchronous resonance

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Statement of Research Interests:

Non-ceramic (composite), porcelain and glass insulators, failure analysis, hv cables, data acquisition and tests for insulation evaluation, condition monitoring

Listed Keywords Describing Research Interests:

1. Maintenance strategies
2. Distribution
3. Transmission

Additional Keywords Describing Research Interests:

1. Condition assessment
2. High voltage engineering
3. Consulting

Selected Publications:

1. R. S. Gorur, E. A. Cherney and J. T. Burnham, "Outdoor Insulators", Textbook, ISBN 0-9677611-0-7, 1999.
2. S. Dalal, R.S. Gorur, and M.L. Dyer, "Aging of Distribution Cables in Service and its Simulation in the Laboratory", IEEE Transactions on Dielectrics and Electrical Insulation (DEIS), Vol. 12, pp. 139-146, 2005.
3. B. Pinnangudi, R.S. Gorur and C. Poweleit, "Qualification of Degradation in Nonceramic Insulator Housing Materials by Laser Ablation", IEEE Trans. on DEIS, Vol. 13, pp. 423-429, 2006.
4. S. Venkataraman, R.S. Gorur, "Prediction of Flashover Voltage of Nonceramic Insulators Under Contaminated Conditions", IEEE Trans. DEIS, Vol. 13, pp.862-869, 2006.
5. "Emerging Nanocomposite Dielectrics", Task Force Report of D1.16.03, Electra, No. 226, pp. 24-32, 2006.

Selected Research Projects:

1. Condition monitoring of nonceramic (composite) insulators in service
2. Assessment of cable insulation properties and remaining life of in-service cables
3. Role of interface in composite insulators
4. Condition monitoring of porcelain and glass insulators from residual strength tests
5. Evaluation of composite materials for high temperature low sag conductors

Principal Research Stem Areas of Interest:

1. T&D technologies

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. High voltage engineering and testing techniques

2. Outdoor insulators for transmission, distribution, and stations
3. Electrical power related topics

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Statement of Research Interests:

My research interests lie in the areas of power system operations, planning and economics with very strong emphasis on the restructuring in the electricity industry. In addition, I work on electricity regulatory policy. Some of the research topics that I am working on are optimal bidding strategies in competitive electricity markets, ancillary services, congestion management, available transfer capability, integration of dispersed generation resources into the existing grid, reliability economics and the relationship of reliability to markets, business models for transmission, transmission expansion in competitive markets and the role of the load as a resource.

Listed Keywords Describing Research Interests:

1. Ancillary services
2. Auctions
3. Bidding
4. Computational techniques and simulation
5. Computer applications
6. Congestion management
7. Distributed resources
8. Economic dispatch
9. Economics
10. Energy management
11. Energy policy
12. Market design
13. Operations
14. Optimization
15. Planning
16. Policy analysis
17. Power system analysis
18. Reliability
19. Risk assessment
20. Transmission
21. Unit commitment

Additional Keywords Describing Research Interests:

1. Demand side participation
2. Restructuring

Selected Publications:

1. M.Liu and G.Gross, "Framework for the Design and Analysis of Congestion Revenue Rights," *IEEE Transactions on Power Systems*, vol. 19:1, pp. 243-251, February 2004.
2. E. Bompard, P. Correia, G. Gross and M. Amelin, "Transmission Congestion-Management Schemes: A Comparative Analysis Under a Unified Framework," *IEEE Transactions on Power Systems*, vol. 18:1, pp. 346-352, February 2003.
3. G. Gross and J. W. Lee, "Analysis of Load Frequency Control Performance Assessment Criteria," *IEEE Transactions on Power Systems*, vol. 16:3, pp 520-525, August 2001.
4. Borghetti, G. Gross, and C. A. Nucci, "Auctions With Explicit Demand-Side Bidding in Competitive Electricity Markets," *The Next Generation of Unit Commitment Models*, B. Hobbs and M. Rothkopf, eds., Kluwer Academic Press, 2000.
5. G. Gross, A. Bose, C. DeMarco, M. Pai, J. Thorp and P. Varaiya, "White Paper on Real-Time Security Monitoring and Control of Power Systems," prepared for Transmission Reliability Program, Office of Power Technologies, Assistant Secretary for Energy Efficiency and Renewable Energy, Department of Energy, August 30, 1999.

Selected Research Projects:

1. Auction bidding mechanisms and strategic
2. Allocation of services
3. AGC
4. Reliability and markets

Principal Research Stem Areas of Interest:

1. Markets
2. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Ancillary services
2. Auctions
3. Bidding
4. Computational techniques and simulation
5. Computer applications
6. Congestion management
7. Distributed resources
8. Economic dispatch
9. Economics
10. Energy management
11. Energy policy
12. Market design
13. Operations
14. Optimization
15. Planning
16. Policy analysis
17. Power system analysis
18. Reliability
19. Risk assessment
20. Transmission
21. Unit commitment

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Demand side participation
2. Restructuring

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Statement of Research Interests:

Electric power quality, power systems engineering, and computer analysis of power systems

Listed Keywords Describing Research Interests:

1. Power quality
2. Power system analysis
3. Dynamics
4. Computer modeling
5. Computer analysis

Selected Publications:

1. P. W. Sauer, G. T. Heydt, V. Vittal, "Guest editorial – special issue on power engineering education," IEEE Transactions on Power Systems. v. 19, No. 1, February 2004, p. 4.
2. G-J. Lee, M. M. Albu, G. T. Heydt, "A power quality index based on equipment sensitivity, cost, and network vulnerability," IEEE Transactions on Power Delivery, v. 19, No. 3, July 2004, pp. 1504 – 1510.
3. G. J. Lee, G. T. Heydt, "An interactive - dynamic mechanism conceptualizing the cost and benefit of electric power quality," J. Electric power systems research," v. 2004, No. 69, pp. 69 – 75, February 2004.
4. G. Heydt, "Improving distribution reliability (the N9 problem) by the addition of primary feeders," IEEE Transactions on Power Delivery, v. 19, No. 1, January 2004, pp. 434 – 435.
5. J. Kyei, R. Ayyanar, G. Heydt, R. Thallam, J. Blevins, "The Design of Power Acceptability Curves," IEEE Transactions on Power Delivery, v. 17, No. 3, July 2002, pp. 828 - 833.

Selected Research Projects:

1. Use of GPS to ascertain overhead conductor sag
2. The use of the power acceptability curves (e.g., CBEMA)
3. The use of satellite photographs for setting tree trimming schedules of rights of way
4. The identification of synchronous machine parameters
5. State estimation enhancement

Principal Research Stem Areas of Interest:

1. T&D
2. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Power quality

2. Power system analysis
3. Computer modeling
4. Computer simulation

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Statement of Research Interests:

Research interests lie in the analysis of power system static and dynamic characteristics. In the former case, power flow convexity is an important research topic as it underlies optimal power flow and market processes. Provably reliable algorithms for distributed state estimation are also vital for operation of large-scale systems. Dynamic analysis focuses on the development of techniques that address robustness to parameter uncertainty, whilst taking account of the nonlinearity and non-smoothness that are inherent in power system behavior. Application areas include assessment of cascading protection operation, and investigation of static/dynamic reactive power support requirements. Extensions of dynamic analysis include model predictive control strategies for emergency control of power systems. Many of these techniques extend beyond power systems though, to general hybrid (continuous/discrete) systems.

Listed Keywords Describing Research Interests:

1. Power system analysis
2. Computational techniques
3. Dynamics
4. Nonlinear systems
5. Hybrid systems
6. Stability
7. Voltage collapse
8. Simulation
9. Parameter estimation
10. MicroGrids
11. Optimization
12. State estimation

Additional Keywords Describing Research Interests:

1. Optimal control
2. Inverse problems
3. Model predictive control

Selected Publications:

1. I.A. Hiskens and M.A. Pai, "Trajectory sensitivity analysis of hybrid systems", IEEE Transactions on Circuits and Systems I: Fundamental Theory and Applications, Vol. 47, No. 2, February 2000, pp. 204-220.
2. I.A. Hiskens, "Power system modeling for inverse problems", IEEE Transactions on Circuits and Systems I: Regular Papers, Vol. 51, No. 3, March 2004, pp. 539-551.
3. I.A. Hiskens, "Nonlinear dynamic model evaluation from disturbance measurements", IEEE Transactions on Power Systems, Vol. 16, No. 4, November 2001, pp 702-710.
4. I.A. Hiskens and R.J. Davy, "Exploring the power flow solution space boundary", IEEE Transactions on Power Systems, Vol. 16, No. 3, August 2001, pp. 389-395.

5. I.A. Hiskens, J-W. Park and V. Donde, "Dynamic embedded optimization and shooting methods for power system performance assessment", in *Applied Mathematics for Deregulated Electric Power Systems: Optimization, Control, and Computational Intelligence*, J. Chow, F. Wu and J. Momoh (Editors), Springer, 2004.

Selected Research Projects:

1. *A Hybrid Systems View of Inverse Problems in Power System Dynamics*, National Science Foundation.
2. *Security Enhancement through Non-disruptive Load Control*, PSerc.
3. *Optimal Allocation of Static and Dynamic VAR Resources*, PSerc.
4. *Analysis and Assessment of Voltage Collapse*, Australian Research Council.
5. *Complex Interactive Networks/Systems*, EPRI/DOD

Principal Research Stem Areas of Interest:

1. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Power system analysis
2. Computational techniques
3. Dynamics
4. Nonlinear systems
5. Hybrid systems
6. Stability
7. Voltage collapse
8. Simulation
9. Parameter estimation
10. Optimization
11. State estimation

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Inverse problems

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Statement of Research Interests:

Process monitoring and diagnostics, signal processing, noise analysis, signal validation, instrumentation (sensor development), fuzzy logic, power plant modeling, calibration reduction.

Listed Keywords Describing Areas of Interest in Professional Development

Instruction:

1. Fuzzy logic
2. Instrumentation
3. Sensors
4. Data analysis

Additional Keywords Describing Areas of Interest in Professional Development

Instruction:

1. Sensor validation
2. Instrumentation fault detection
3. System vulnerability

Selected Publications:

1. "Use of Satellite Technologies for Power System Measurements, Command, and Control," *Special Issue on Energy Infrastructure Defense Systems, Proceedings of the IEEE*.
2. "Power System Sensor Failure Detection and Characterization Using Fuzzy Logic," *Proceedings of the Seventh IASTED International Conference on Power and Energy Systems*, Clearwater, FL, Nov. 28-Dec. 1, 2004, pp. 291-296.
3. "Reducing State Estimation Uncertainty Through Fuzzy Logic Evaluation of Power System Measurements," *Proceedings of the 8th International Conference on Probability Methods Applied to Power Systems*, Ames, IA, Sept. 12-16, 2004, pp. 205-211.
4. "State-of-the-Art Methods to Protect Power Network Sensory Systems Against Intrusion," *Proceedings of the Thirty-fifth Annual North American Power Symposium (NAPS 2003)*, Rolla, MO, October 20-21, 2003, pp. 537-544.
5. "The Role of Sensors in the Reduction of Power System Vulnerability," *Proceedings of the Thirty-fifth Annual North American Power Symposium (NAPS 2003)*, Rolla, MO, October 20-21, 2003, pp. 552-558.

Selected Research Projects:

1. Development of Advanced Sensor Systems to Assess the Vulnerability of Electric Power Networks
2. Unified Power and Communication Infrastructures for High Security Electricity Supply
3. Extended State Estimation for Synchronous Generator Parameters

4. Development of a Real Time Tool for Intrusion Detection and Mitigation to Enhance SCADA System Security
5. Innovative Technologies for Defense Against Catastrophic Failures of Complex Interactive Networks
6. Well Field Control System at Coronado Generating Station
7. Improving Electric Power Industry Competitiveness Through the Application of Artificial Intelligence
8. A Novel Integrated Electron Emission Field Sensor for Measuring Electric and Magnetic Fields
9. Electric Transmission Line Insulator Flashover Predictor System
10. Power Plant Modeling with Neural Networks

Principal Research Stem Areas of Interest:

1. T&D technology
2. Systems

Listed Keywords Describing Research Interests:

1. Fuzzy logic
2. Instrumentation
3. Sensors
4. Data analysis
5. Signal processing
6. Digital signal processing

Additional Keywords Describing Research Interests:

1. Sensor validation
2. Instrumentation fault detection

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Statement of Research Interests:

Research in my lab is focused on design, implementation, and applications of distributed knowledge networks for flexible and rapidly customizable information extraction, integration, and organization and data-driven knowledge acquisition from heterogeneous, distributed, autonomous, dynamic information sources. Of particular interest are theoretically well-founded yet practical algorithms for distributed data mining, and security-preserving data mining, and scalable approaches to learning from massive data sets, and algorithms and protocols for multi-agent coordination, negotiation, decision making, and distributed control of complex systems. Our ongoing work in this area has led to the development of INDUS (Intelligent Data Understanding System) for such tasks. Power systems applications of this research include information infrastructures for monitoring, control, and protection of complex, heterogeneous, dynamic energy networks consisting of many autonomous interacting entities (e.g., producers, consumers).

Listed Keywords Describing Research Interests:

1. Artificial intelligence
2. Complex systems
3. Data analysis
4. Database management
5. Decision analysis
6. Genetic algorithms
7. Information technology
8. Infrastructure protection
9. Intelligent systems
10. Load forecasting
11. Multi-agent systems
12. Networks
13. Neural networks
14. Probability analysis
15. Software agents
16. Software engineering
17. Statistical analysis
18. System engineering
19. Visualization

Additional Keywords Describing Research Interests:

1. Agents
2. Data mining
3. Machine Learning
4. Agent coordination
5. Multi-agent organizations

6. Multi-agent learning
7. Information extraction
8. Data integration
9. Ontologies
10. Knowledge-based systems
11. Distributed learning
12. Distributed computing
13. Agent-oriented software engineering

Selected Publications:

1. Caragea, D., Silvescu, A., and Honavar, V. (2001). Invited Chapter. Towards a Theoretical Framework for Analysis and Synthesis of Agents That Learn from Distributed Dynamic Data Sources. In: *Emerging Neural Architectures Based on Neuroscience*. Berlin: Springer-Verlag.
2. Polikar, R., Udpa, L., Udpa, S., and Honavar, V. (2001) Learn++: An Incremental Learning Algorithm for Multi-Layer Perceptron Networks. *IEEE Transactions on Systems, Man, and Cybernetics*. Vol. 31. No. 4. pp. 491-508.
3. Mikler, A., Honavar, V. and Wong, J. (2001). Autonomous Agents for Coordinated Distributed Parameterized Heuristic Routing in Large Communication Networks. *Journal of Systems and Software*. Vol. 56. pp. 231-246.
4. Wong, J., Helmer, G., Naganathan, V. Polavarapu, S., Honavar, V., and Miller, L. (2001) SMART Mobile Agent Facility. *Journal of Systems and Software*. Vol. 56. pp. 9-22.
5. Yang, J. & Honavar, V. (1998). Feature Subset Selection Using a Genetic Algorithm. **Invited** paper. *IEEE Intelligent Systems* vol. 13, no. 2., pp. 44-49.

Selected Research Projects:

1. Algorithms and Software for Knowledge Acquisition from Heterogeneous Distributed Data. National Science Foundation.
2. Interactive Visual Overviews of Large, Multi-Dimensional Datasets, National Science Foundation.
3. Automated Integration of Condition Monitoring with an Optimized Maintenance Scheduler for Circuit Breakers and Power Transformers. Power Systems Engineering Research Center.
4. Distributed Knowledge Networks to Support Security-Economy Decisions in Stressed Electric Power Systems. National Science Foundation.
5. Constructive Neural Network Learning Algorithms for Pattern Classification, *National Science Foundation*,

Principal Research Stem Areas of Interest:

1. T&D technologies
2. Markets
3. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Artificial intelligence
2. Complex systems
3. Data analysis
4. Database management
5. Decision analysis

6. Genetic algorithms
7. Information technology
8. Infrastructure protection
9. Intelligent systems
10. Load forecasting
11. Multi-agent systems
12. Networks
13. Neural networks
14. Probability analysis
15. Software agents
16. Software engineering
17. Statistical analysis
18. Systems engineering
19. Visualization

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Agents
2. Data mining
3. Machine Learning
4. Agent coordination
5. Multi-agent organizations
6. Multi-agent learning
7. Information extraction
8. Data integration
9. Ontologies
10. Knowledge-based systems
11. Distributed learning
12. Distributed computing
13. Agent-oriented software engineering

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Statement of Research Interests:

Power Electronics (FACT), High Voltage Technique, Power System Analysis

Listed Keywords Describing Research Interests:

1. High voltage engineering
2. Power electronics
3. FACTS
4. Power system analysis
5. Fiber optics

Additional Keywords Describing Research Interests:

1. Inverters
2. Composite insulators
3. Neural network and fuzzy logic

Selected Publications:

1. G. G Karady, K. A. Nigim: "Improve Learning Efficiency by Using General Purpose Mathematics Software in Power Engineering". ". IEEE Transaction Power Systems. Vol.18, No. 3, pp. 979-985, August 2003.
2. J Gu, G.G. Karady, R. Farmer: "Real-time Analysis of Transient Stability Using Reconfigurable Analog VLSI", Power Engineering Letter. IEEE Transaction Power Systems, Power Engineering Letter, Vol.18, No. 3, pp. 1207-1209, August 2003.
3. G.G Karady, K E Holbert: "Novel Technique to Improve Power Engineering Education Through Computer-Assisted Learning", IEEE Transaction Power Systems. Vol.19, No. 1, pp. 81-87, February 2004
4. G. G. Karady, A. A. Daoud, M. A. Mohammed, I. A. Amin, " Fast Learning Algorithm for Synchronous Generator Instability Prediction," Engineering Intelligent Systems, Vol. 12, No. 2, pp. 67-72, June 2004.
5. Devarajan Srinivasan, George G Karady: "Development of the Dry-band Arc on in All-Dielectric Self-supporting Cables during Laboratory Test". ". IEEE Transaction Power Delivery, Vol: 19, No. 4, pp:1746-1750, October 2004
6. Baozhuang Shi; George Karady; Qi Huang; M.W Tuominen: "Experimental Studies of the Characteristics of Dry Band Arcing on ADSS Fiber Optic Cables" IEEE Transaction Power Delivery, Vol: 19, No. 4, pp:1936-1940, October 2004

Selected Research Projects:

1. Aging of fiber optic cables in high voltage environment
2. Prediction of power system stability by fast learning robotic algorithm

Principal Research Stem Areas of Interest:

1. T&D technologies

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Power system analysis
2. HVDC
3. High voltage engineering
4. Forecasting
5. Power electronics
6. FACTS
7. Fiber optics

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Engineering education

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Statement of Research Interests:

Protective relaying, control and monitoring of power systems. Intelligent techniques for automated fault analysis and disturbance monitoring. New concepts for implementation and use of digital simulators for relay testing. Advanced algorithms for fault locating and protective relaying. Modeling and simulation techniques for automated assessment of power quality disturbances. Wireless communications and mobile agent software. Methods and tools for power engineering education.

Listed Keywords Describing Research Interests:

1. Substation automation
2. Protection
3. Relay testing
4. Artificial intelligence
5. Communications
6. Data analysis
7. Digital signal processing
8. Distribution automation
9. Energy management
10. Fault analysis
11. Fuzzy logic
12. Genetic algorithms
13. Instrumentation
14. Intelligent systems
15. Multi-agent systems
16. Neural networks
17. Outage management
18. Power quality
19. Protection systems
20. Sensors
21. Simulation
22. Software agents
23. Substations
24. System protection schemes
25. Wireless communications

Additional Keywords Describing Research Interests:

1. Power system monitoring
2. Instrument transformers
3. Relay modeling and simulation

Selected Publications:

1. M. Kezunović, "Fundamentals of Power System Protection," Electrical Engineering Handbook, Chapter on Energy Conversion, Academic Press, (in Press).
2. M. Kezunović, B. Peruničić, "Fault Location," Wiley Encyclopedia of Electrical and Electronics Terminology, Vol. 7, pp. 276-285, John Wiley, 1999.
3. S. Vasilić, M. Kezunović, "Fuzzy ART Neural Network Algorithm for Classifying the Power System Faults," *IEEE Transactions on Power Delivery*, (in Press).
4. M. Kezunović, Z. Ren, G. Latiško, D. R. Sevcik, J. Lucey, W. Cook, E. Koch, "Automated Monitoring and Analysis of Circuit Breaker Operation," *IEEE Transactions on Power Delivery*, (in Press).
5. M. Kezunović, "User Friendly, Open System Software for Teaching Protective Relaying Application and Design Concepts," *IEEE Transactions on Power Systems*, Vol. 18, No. 3, August 2003.

Selected Research Projects:

1. Automated Topology Analysis Using Substation Data
2. Performance Assessment of Advanced Digital Measurement and Protection System
3. Substation Data Uses for Improved Local and EMS Functions
4. Improved State Estimation via Advanced Substation Monitoring
5. Accurate Fault Location in Transmission and Distribution Networks Using Modeling, Simulation and Limited Field Recorded Data

Principal Research Stem Areas of Interest:

1. T&D Technologies
2. Systems
3. Markets

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Protection
2. Relay Testing
3. Fault analysis

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Relay modeling and simulation
2. Power system monitoring
3. Automated disturbance analysis

Yoshihiro Kobayashi

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Statement of Research Interests:

He is interested in the application of artificial intelligence for architectural and urban planning, especially in 3D city modeling from satellite images using the technologies of image processing and soft computing. He developed computer-based application to extract city components from satellite images as his dissertation project. He is also interested in developing various tools and programs for Computer Aided Design (CAD), Web application, Geographical Information System (GIS), and Database Management system.

Listed Keywords Describing Research Interests:

1. Artificial intelligence
2. Computer modeling
3. Visualization

Additional Keywords Describing Research Interests:

1. Image Processing
2. Computer Aided Design
3. Knowledge Engineering

Selected Publications:

1. Kobayashi, Y., "3D City Model Generator: The application of Neuro-Fuzzy Systems in CAD", Proceeding of Association for Computer Aided Design in Architecture (ACADIA 2002), Pomona, CA, October 2002.
2. Kobayashi, Y., and Watanabe, S., "3D City Modeler with Fuzzy Multiple Layers Perceptron", Journal of Architectural institution of Japan, April 2002.
3. Kobayashi, Y. and Sharma, M., "Dynamic Interface for Axial Spatial Arrangements Using Soft Computing", Proceeding of the 8th Iberoamerican Congress of Digital Graphics (Sigradi 2004), Brazil, November, 2004
4. Murray Milne, Gomez, F. C., Leeper, D., Kobayashi, Y., Kohut, T., Muthig, P., "Using HEED to Design Energy Efficient Affordable Housing", the proceeding of ASES 2002, Reno, Nevada, June 18, 2002
5. Murray Milne, Gomez, F. C., Leeper, D., Kobayashi, Y., Zurick, J., Weintraub, D., Miranda, H., "HEED, home energy efficient design", the proceeding of the 18th conference on Passive and Low Energy Architecture (PLEA) in Brazil, Nov. 2001

Selected Research Projects:

1. Creating 3D City Model of Phoenix Downtown
2. HEED project to develop 3D software to simulate the energy costs for residential houses.
3. REED project to develop Web application to simulate the energy cost.

Principal Research Stem Areas of Interest:

1. AEC (Architecture, Engineering, and Construction)
2. GIS (Geographical Information Systems)
3. IT (Information Technology)

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Artificial intelligence
2. Computational techniques
3. Computer applications
4. Computer modeling
5. Computer simulation
6. Decision analysis
7. Fuzzy networks
8. Graphics and visualization
9. Neural networks
10. Programming

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Image processing
2. Image understanding
3. Remote sensing
4. Geographical information system,
5. Computer aided design system
6. City Modeling

Robert Lasseter

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Statement of Research Interests:

My general area of my research is power electronics, its application to power systems and the impact of distributed resources restructuring of the electrical power system. I am interested in control and design of systems of distributed generation and storage devices, local reliability, power quality, premium power, High Voltage Direct Current (HVDC) systems, Static Var Compensators (SVC), Flexible AC Transmission Systems (FACTS), and MicroGrids

Listed Keywords Describing Research Interests:

1. Circuits and systems
2. Complex systems
3. Computer modeling
4. Computer simulation
5. Control systems
6. Control theory
7. Conversion
8. Custom power
9. Demand side management
10. Distributed resources
11. Distribution
12. Dynamics
13. EMTF applications and modeling
14. Energy storage
15. Filters
16. FACTS
17. Fuel cells
18. Harmonics
19. HVDC
20. Inverters
21. Load modeling
22. MicroGrids
23. Microturbines
24. Nonlinear systems
25. Photovoltaics
26. Power electronics
27. Power quality
28. Power system analysis
29. Protection systems
30. Reliability
31. Renewable energy
32. Substations
33. Systems

34. Voltage quality
35. Wind energy

Additional Keywords Describing Research Interests:

1. Controls

Selected Publications:

1. Lasseter, R. H., "Role of Distributed Generation in Reinforcing Critical Electric Power Infrastructure," IEEE PES WM 2001, 28 January 2001
2. Lasseter R.H., and P. Piagi, "Providing Premium Power Through Distributed Resources," Advanced Technology, 34 Hawaii International Conference, Jan 2000.
3. Lasseter, R. H., "Control of Distributed Resources," Bulk Power Systems Dynamics and Control IV; Restructuring, Santorini, Greece, August 23-28, 1998, pgs.323-330. or at //www.pserc.wisc.edu/index_publications.html document PSerc 98-23
4. Hochgraf, C., and R.H. Lasseter, "StatCom controls for operation with unbalanced voltages," IEEE Transactions on Power Delivery. Volume 13, Issue 2, Page(s): 538 - 544, April 1998.
5. Jalali, S., I. Dobson, R.H. Lasseter, and G. Venkataramanan, "Switching Time Bifurcations in a Thyristor Controlled Reactor", IEEE Transactions on Circuits and Systems-I: Fundamental Theory and Applications. Vol. 43. No.3, pp 209-218, March 1996.

Selected Research Projects:

1. "Scenarios for Distributed Technology Applications With Steady State and Dynamic Models of Loads and Micro-Sources," Consortium for Electric Reliability Technology Solutions, Office of Power Technologies, U.S. Department of Energy, 14 April 2000 Principle Authors; Robert Lasseter, Kevin Tomsovic and Paolo Piagi
2. "Sensitive Load Steady State Scenario," Consortium for Electric Reliability Technology Solutions, Office of Power Technologies, U.S. Department of Energy, 14 April 2001 Principle Authors; Robert Lasseter, and Paolo Piagi

Principal Research Stem Areas of Interest:

1. T&D technologies
2. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Computer simulation and modeling
2. Conversion
3. Custom power
4. EMTP applications and modeling
5. FACTS
6. Harmonics
7. HVDC
8. Inverters
9. Load modeling
10. MicroGrids
11. Micro-turbines
12. Power electronics
13. Power quality
14. Voltage quality

James D. McCalley

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Statement of Research Interests:

Dr. McCalley's research in electric power has included the following areas: security assessment, probabilistic analysis, power systems dynamics and control, software agents and multi-agent systems, and educational modules for power engineering.

Listed Keywords Describing Research Interests:

1. Risk assessment
2. Reliability
3. Security assessment
4. Dynamics
5. Voltage collapse
6. Operations
7. Outage management
8. Complex systems
9. Information technology
10. Intelligent systems
11. System protection schemes
12. Software agents
13. Multi-agent systems
14. Decision analysis
15. Maintenance strategies

Selected Publications:

1. Y. Dai, J. McCalley, V. Vittal, "Annual Risk Assessment for Overload Security," to appear in IEEE Trans. On Power Systems.
2. H. Wan, J. McCalley, V. Vittal, "Risk-Based Voltage Security Assessment," IEEE Transactions on Power Systems. Vol. 15, No. 4, Nov., 2000, pp 1247-1254.
3. J. McCalley, V. Vittal, N. Abi-Samra, "Use of Probabilistic Risk in Security Assessment: A Natural Evolution," International Conference on Large High Voltage Electric Systems (CIGRE), Selected by the CIGRE U.S. National Committee for presentation at the CIGRE 2000 Conference, August, 2000, Paris, paper 38-104, in Proceedings of the CIGRE 2000 Session.
4. W. Hua, J. McCalley, V. Vittal, "Increasing Thermal Ratings using Risk Analysis," IEEE Trans. On Pwr Sys., Vol. 14, No. 3, Aug., 1999.
5. J. McCalley, W. Fu, "Reliability of Special Protection Schemes," IEEE Trans. on Power Systems, Vol. 14, No. 4, Nov. 1999, pp.1400-1406

Selected Research Projects:

1. J. McCalley (PI), T. Van Voorhis, and S. Meliopoulos, Power System Engineering Research Center (PSerc), "Risk-based Maintenance Allocation and Scheduling for Bulk Transmission System Equipment," June, 2001-June, 2003.

2. J. McCalley (PI), V. Vittal, The Electric Power Research Institute (EPRI), "Security Mapping and Reliability Index Evaluation," April, 1999 – June 6, 2001.
3. J. McCalley (PI), The Electric Power Research Institute (EPRI), "Decision Making using Risk-Based Security Assessment," January 1, 1998 – December 31, 1999, tailored collaboration with Mid American Energy Company.
4. J. McCalley (PI), V. Ajarapu, G. Sheblé, V. Vittal, and S. Venkata, National Science Foundation, "Module Based Multimedia Courseware Development for Power System Education," May 1, 1997-May 1, 2000. This proposal was submitted jointly with faculty at Virginia Tech.
5. J. McCalley (PI) and V. Honavar, National Science Foundation (NSF) Small Grants for Exploratory Research (SGER) "Development of Distributed Knowledge Networks to Provide Decision-Support for Security-Economy Decisions in Operating Stressed Power Systems," September, 2000-September, 2001.

Principal Research Stem Areas of Interest:

1. Systems
2. Markets

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Security assessment
2. Operations
3. Reliability
4. Risk assessment

A. P. Sakis Meliopoulos

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Statement of Research Interests:

As provided on my website and in the lists given below.

Listed Keywords Describing Research Interests:

1. Reliability
2. State estimation
3. Power quality
4. MicroGrids
5. Graphics and visualization
6. Grounding
7. Safety

Additional Keywords Describing Research Interests:

1. GPS-synchronized measurements and applications
2. Multiphase modeling and analysis

Selected Publications:

1. Feng Xia and A. P. Sakis Meliopoulos, 'A Methodology for Probabilistic Simultaneous Transfer Capability Analysis,' *IEEE Transactions on Power Systems*, Vol. 11, No. 3, pp. 1269-1278, August 1996.
2. A. P. Sakis Meliopoulos and Fan Zhang, 'Multiphase Power Flow and State Estimation for Power Distribution Systems,' *IEEE Transactions on Power Systems*, Vol. 11, No. 2, pp. 939-946, May 1996.
3. Y. Tang and A. P. Sakis Meliopoulos, 'Power System Small Signal Stability Analysis with FACTS Elements', *IEEE Transactions on Power Delivery*, Vol. 12, No. 3, pp. 1352-1361, July 1997.
4. A. P. Sakis Meliopoulos and George J. Cokkinides, "Substation Lightning Shielding and Risk Assessment", *European Transactions on Electrical Power (ETEP)*, Vol. 13, No. 6, pp. 407-412, November/December 2003.
5. A. P. Sakis Meliopoulos and George J. Cokkinides, "A Virtual Environment for Protective Relaying Evaluation and Testing", *IEEE Transactions of Power Systems*, Vol. 19, No. 1, pp. 104-111, February, 2004.

Selected Research Projects:

1. "Development of Tools for MicroGrid Analysis", Development of simulation tools for steady state analysis of unbalanced and asymmetric distribution systems with distributed energy sources.
2. "Shielding and Grounding of Electrical Installations", Development of techniques for the analysis of the grounding and shielding of electrical installations for the assessment of their safety.

3. "Comprehensive Reliability Assessment". Development of methodologies for the assessment of bulk power system reliability assessment using enumerative approaches.
4. "Transient Testing of Protective Relays: Study of Benefits and Methodology", Development of advanced relay testing methodologies using physically based modeling and analysis.
5. "Optimal Allocation of Static and Dynamic VAR Resources" Development of methodologies for optimal placing of dynamic VAR resources to improve voltage recovery performance and avoid voltage collapse.

Principal Research Stem Areas of Interest:

1. T&D technologies
2. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Available transfer capability
2. Computational techniques
3. Computer simulation
4. Distributed resources
5. Distribution systems
6. FACTS
7. Graphics and visualization
8. Grounding
9. Safety
10. MicroGrids
11. State estimation
12. Power quality
13. Protection
14. Reliability
15. Stray voltage

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Dynamic Disturbance Recorders
2. PMU Applications

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Statement of Research Interests:

My graduate education was in the area of electromagnetics and my experience over the last 25 years has been in the application of electromagnetics to power systems. Over this time, I have directed projects on topics that include high voltage insulation, numerical methods in quasielectrostatics, power line propagation and coupling, electromagnetic interference from power lines, electromagnetic environment of power lines, grounding, magnetic field shielding, electromagnetic compatibility of power lines and fiber optics and high voltage component design. My primary interest at this time is in power system electromagnetic compatibility.

Listed Keywords Describing Research Interests:

1. Electromagnetics
2. Fiber optics
3. High voltage engineering
4. Stray voltage
5. Transmission

Additional Keywords Describing Research Interests:

1. Power system electromagnetic compatibility

Selected Publications:

1. R. G. Olsen and M. Wu, "A Wideband Model for Electromagnetic Interference from Corona on Multiconductor Power Lines," *Radio Science*, Vol. 26, No. 1, pp. 73–88, January- February 1991.
2. R.G. Olsen and M.C. Willis, "A Comparison of Exact and Quasi-Static Methods for Evaluating Grounding Systems at High Frequencies," *IEEE Trans. on Power Delivery*, Vol. 11, pp. 1071-1081, April 1996
3. R.G. Olsen and P. Moreno, "Some Observations about Shielding Extremely Low Frequency Magnetic Fields by Finite Width Shields," *IEEE Trans. on Electromagnetic Compatibility*, Vol. 38, pp. 460-468, August, 1996
4. M.W. Tuominen and R.G. Olsen, "Electrical Design of All-Dielectric Self-Supporting Optical Fiber Cable," *IEEE Transactions on Power Delivery*, Vol. PWRD-15, No. 3, pp. 940-947, July 2000
5. D.B. Phillips, R.G. Olsen and P.D. Pedrow, "Corona Onset as a Design Optimization Criterion for High voltage Electrodes," *IEEE Transactions on Dielectrics and Electrical Insulation*, Vol. TDEI-7, pp. 744-751, December 2000
6. J. M. Silva and R. G. Olsen, "Use of Global Positioning System (GPS) Receivers Under Power Line Conductors," *IEEE Transactions on Power Delivery*, Vol PWRD-17, pp. 938-944 October 2002
7. R. G. Olsen and K. S. Edwards, "A New Method to Measure High Voltage Transmission Line Conductor Sag," *IEEE Transactions on Power Delivery*, Vol. PWRD-17, pp. 1142 – 1151, October 2002

Selected Research Projects:

1. The possibility of wideband communication on electric power lines
2. A new method to measure high voltage transmission line sag

Principal Research Stem Areas of Interest:

1. T&D technologies

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Electromagnetics
2. Fiber optics
3. High voltage engineering
4. Stray voltage
5. Transmission

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Power system electromagnetic compatibility

Shmuel S. Oren

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Statement of Research Interests:

My work can be described as 'market engineering' using price and incentive mechanisms for coordination of decentralized complex systems. Market engineering employs economic theory and operations research tools in the same way as mechanical or electrical engineering employ physics and mathematics. Energy and in particular electricity systems, which provide a fertile domain for market engineering, have been the main focus of my research and consulting activities with emphasis on planning, economic analysis, market design and risk management. On the methodological side my teaching and research activities include nonlinear optimization, decision analysis, auction theory and financial engineering.

Listed Keywords Describing Research Interests:

1. Market design
2. Congestion management
3. Ancillary services
4. Auctions
5. Bidding
6. Corporate finance
7. Economics
8. Economic dispatch
9. Electricity trading
10. Energy management
11. Energy policy
12. Pricing
13. Options
14. Risk management
15. Markets
16. Unit commitment
17. Optimization
18. Demand side management

Additional Keywords Describing Research Interests:

1. Restructuring
2. Financial engineering
3. Option theory
4. Real option analysis
5. Product differentiation

Selected Publications:

1. "Folk Theorems on Transmission Open Access: Proofs and Counter Examples" (with F. Wu, P. Varaiya and P. Spiller), *Journal of Regulatory Economics*, 1996

2. Kamat, Rajnish and Shmuel S. Oren. "Rational Buyer Meets Rational Seller: Reserves Markets Equilibrium Under Alternative Auction Design", Journal of Regulatory Economics, 21:3 (2002) 247-288
3. Kamat, Rajnish and Shmuel S. Oren. "Exotic Options for Interruptible Electricity Supply Contracts" Journal of Operations Research Vol 50, No 5 (September-October) 2002 pp 835-850.
4. Deng, Shijie and Shmuel Oren S., "Incorporating Operational Characteristics and Startup Costs in Option-Based Valuation of Power Generation Capacity", Probability in Engineering and Information Sciences, Vol. 17, No. 2 (2003) pp. 155-182.
5. Yao, J., S. Oren and I. Adler, "Computing Two Settlement Cournot Equilibria in Electricity Markets with Forward and Spot Price Caps" Proceeding of the 38th Hawaii International Conference on Systems Sciences HICSS38. Big Island, Hawaii, January 3-6, 2005.

Selected Research Projects:

1. Market Redesign: Incorporating The Lessons Learned From Actual Experiences For Enhancing Market Design
2. Planning and market mechanisms for transmission investment in unbundled electricity systems
3. Hedging volumetric risk in wholesale electricity procurement using standard price based hedging instruments
4. Capacity mechanisms for assuring generation adequacy based on energy options
5. Modeling and computation of two settlement market equilibrium in electricity markets with market power, congestion and contingencies.

Principal Research Stem Areas of Interest:

2. Markets (stem leader)

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Market design
2. Congestion management
3. Ancillary services
4. Auctions
5. Bidding
6. Corporate finance
7. Economics
8. Economic dispatch
9. Electricity trading
10. Energy management
11. Energy policy
12. Pricing
13. Options
14. Risk management
15. Markets
16. Unit commitment
17. Optimization
18. Demand side management

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Restructuring
2. Financial engineering
3. Option theory
4. Real options and decision analysis
5. Product differentiation

Tom Overbye

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Department:

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Statement of Research Interests:

My general research interests are electric power system operation, control, data management and visualization. Specific work has focused in the areas of power system voltage stability assessment, power flow convergence and solvability, simulation and market power assessment of electricity markets, development of optimal bidding strategies, visualization of power system security and economic information, and use of interactive 3D for data visualization.

Listed Keywords Describing Research Interests:

1. Auctions
2. Available transfer capability
3. Bidding
4. Computational techniques and simulation
5. Computer simulation
6. Computer modeling
7. Data analysis
8. Graphics and visualization
9. Markets
10. Optimization
11. Power system analysis
12. Visualization
13. Voltage collapse

Selected Publications:

1. J.D. Weber, T.J. Overbye, "Voltage Contours for Power System Visualization," IEEE Trans. on Power Systems, February, 2000, pp. 404-409.
2. T.J. Overbye, "Reengineering the Electric Grid", American Scientist, pp. 220-229, May-June, 2000.
3. T.J. Overbye, J.D. Weber, "Visualizing the Electric Grid," IEEE Spectrum, February 2001, pp. 52-58.
4. T. J. Overbye, Y. Sun, R. P. Klump, and J. D. Weber, "Interactive 3D visualization of power system information," Electric Power Components & Systems, pp. 1205-1215, December 2003.
5. Y. Sun, T.J. Overbye, "Visualizations for power system contingency analysis data," IEEE Trans. on Power Systems, vol. PWRs-19, pp. 1859-1866, November 2004.

Selected Research Projects:

1. PSERC membership project on power system visualization
2. NSF project on development of optimal bidding strategies for electric power markets

3. NSF project on visualization of electric power system data (completed)
4. NSF Small Business Innovation Research Program with PowerWorld corporation on development of interactive 3D environment for visualization of power system information

Principal Research Stem Areas of Interest:

1. Systems
2. Markets

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Power system analysis
2. Visualization
3. Optimization
4. Markets
5. Computer simulation
6. Computational techniques
7. Graphics and visualization

M. A. Pai

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Statement of Research Interests:

My research is connected with Power system stability, control and computation. My current projects involve using trajectory sensitivity techniques for security assessment in real time and investigating a new method of model reduction using Krylov Subspace technique. I am also looking at system integration of Distributed Generation such as Fuel Cells, Wind Farms with the grid from the point of view of stability.

Listed Keywords Describing Research Interests:

1. Nonlinear systems
2. Power system analysis
3. Stability
4. Security assessment
5. Control theory
6. Computer simulation
7. Computer modeling
8. Hybrid systems

Additional Keywords Describing Research Interests:

1. Model reduction
2. Sensitivity Analysis
3. Distributed generation

Selected Publications:

1. M.A.Pai, D.P.Sen Gupta and K.R.Padiyar *Small Signal Analysis of Power Systems* Narosa Publishing New Delhi, 2004. Available from Morgan & Claypool Publishers, 40 Oak View Drive, San Rafael, CA, 94903, USA davies@morganclaypool.com
2. D. Chaniotis and M.A.Pai "A New Preconditioning Technique for the GMRES Algorithm in Power Flow and P-V Curve calculations" *International Journal of Electric Power and Energy Systems* Vol 25, pp.239-245, 2003
3. T. B. Nguyen and M. A. Pai, "Dynamic security-constrained rescheduling of power systems using trajectory sensitivities," *IEEE Transactions on Power Systems*, vol. 18, no. 2, pp. 848-854, May 2003
4. S. A. Soman, T. B. Nguyen, and M. A. Pai, and R. Vaidyanathan "Analysis of angle stability problems: A transmission protection systems perspective," *IEEE Transactions on Power Delivery*, vol. 19, no. 3, pp.1024-1033, July 2004
5. D.Chaniotis and M.A.Pai "Model Reduction in Power Systems using Krylov Subspace Methods" To appear in *IEEE transactions in Power Systems* TPWRS-00105-2004.R1 Also Paper # 05GM0225 IEEE Summer Power Meeting, June 2005

Selected Research Projects:

1. Trajectory sensitivity analysis as a tool for dynamics security assessment
2. Model reduction in power systems using Krylov sub-space techniques
3. Hybrid systems viewpoint in modeling power systems

Peter W. Sauer

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Statement of Research Interests:

See keyword list below

Listed Keywords Describing Research Interests:

1. Available transfer capability
2. Circuits and systems
3. Complex systems
4. Computer simulation
5. Computer modeling
6. Dynamic equivalents
7. Dynamics
8. Electric machinery
9. Load modeling
10. Motors
11. Nonlinear systems
12. Oscillations
13. Power system analysis
14. Security assessment
15. Stability

Selected Publications:

1. Stability limited load supply and interchange capability (with K.D. Demaree and M.A. Pai), IEEE Transactions on Power Apparatus and Systems, Vol. PAS-102, No. 11, Nov. 1983, pp. 3637-3643.
2. Power system steady-state stability and the load-flow Jacobian (with M.A. Pai), IEEE Transactions on Power Systems, Vol. 5, No. 4, November 1990, pp. 1374-1383.
3. Power System Dynamics and Stability (with M. A. Pai), Prentice Hall, Upper Saddle River, New Jersey, 1998.

Selected Research Projects:

1. National Science Foundation:
 - Stability of Power Systems with Detailed Modeling
 - Power system load modeling concepts
2. Electric Power Research Institute:
 - On-line Detection of Power System Instabilities
 - Dynamic Security Assessment of Power Systems
3. PSERC membership projects on:
 - Ancillary Services (Reactive Power), Voltage Collapse Monitor,
 - Control of Oscillations, Integrated Security Analysis

Principal Research Stem Areas of Interest:

1. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Available transfer capability
2. Circuits and systems
3. Complex systems
4. Computer simulation
5. Computer modeling
6. Dynamic equivalents
7. Dynamics
8. Electric machinery
9. Load modeling
10. Motors
11. Nonlinear systems
12. Oscillations
13. Power system analysis
14. Security assessment
15. Stability

Gerald B. Sheblé

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Statement of Research Interests:

His research interests include artificial life techniques (such as artificial neural networks, genetic algorithms, evolutionary programming, simulated annealing, expert systems, knowledge based systems) and optimization (linear programming, dynamic programming, convex optimization, goal programming) and market analysis (such as static and dynamic simulation, strategic assessment) technologies for various industrial applications. His recent research is on asset management and risk management based on market information. His primary expertise is in power system domain (optimization, scheduling, and markets).

Listed Keywords Describing Research Interests:

1. Auctions
2. Bidding
3. Complex systems
4. Computer simulation
5. Congestion management
6. Cost analysis
7. Demand side management
8. Deregulation policies
9. Distributed resources
10. Electricity trading
11. Energy management
12. Energy policy
13. Market design
14. Operations
15. Optimization
16. Options
17. Planning
18. Pricing
19. Reliability assessment
20. Renewable energy
21. Restructuring policies
22. Risk assessment
23. Risk management
24. Wind energy

Additional Keywords Describing Research Interests:

1. Auction mechanisms
2. Complex Adaptive Systems

Selected Publications:

1. Gerald B. Sheblé, Kah-Hoe Ng, "Economic Lessons from the Market Evolution of Present US Power Markets," IEE Invited Journal Paper, IEE Proceedings, Volume 148, Issue 2, March 2001, Pages 185 – 188, invited (4).

2. Somgiat Dekrajangpetch, Gerald B. Sheblé, "Structures and Formulations for Electric Power Auctions," *Electric Power Systems Research*, v54, n3, 2000, Elsevier Sequoia SA, Lausanne, Switzerland, p 159-167. (9)
3. Somgiat Dekrajangpetch, Gerald B. Sheblé, "Interior Point linear Programming Algorithm for Auction Methods," *IEEE Transactions on Power Systems*, v15, n2, May, 2000, IEEE, Piscataway, NJ, USA, p 572-578. (7)
4. Richter, C. W., and G. B. Sheblé, "Profit Based Unit Commitment GA for the Competitive Environment," presented at the 1999 IEEE Winter Power Meeting, and published *IEEE Transactions on Power Systems*, v15, n2, May, 2000, IEEE, Piscataway, NJ, USA, p 715-721. Abstract published *IEEE Power Engineering Review*, v20, n5, 2000, IEEE, Piscataway, NJ, USA, p 80.
5. Dekrajangpetch, Somgiat and G. B. Sheblé, "Auction Implementation: Comparison of Auction Methods Using Simplex, Interior Point, and LaGrangian Relaxation," for presentation and for publication at the 1999 IEEE Winter Power Meeting, pp. 1-6.

Selected Research Projects:

1. **Gerald B. Sheblé**, "Project Title: Agent Modeling for Integrated Power System, Power and Fuel Market Simulation," PSERC, \$160,000, \$70,000 ISU, Co-Principle Investigators, Anjan Bose (WSU), Judith Cardell (Smith College), Industrial Team: Mark Sanford, GE Energy, Jianzhong Tong, PJM Interconnection, Jay Giri, AREVA T&D Corporation, James Price, California ISO (\$70,000).
2. **Gerald B. Sheblé**, "Computer Simulation of an Electric Marketplace by Agents Seeking Reliability," National Science Foundation, \$109,999, 09/01/02 - 08/31/05
3. **Gerald B. Sheblé**, "Uncertain Power Flows and Transmission Expansion Planning," Co-Principle Investigators, Gerald T. Heydt (ASU), Peter Sauer (University of Illinois), PSERC, \$160,000, \$80,000 ISU, 5/2004-5/2006 (\$80,000).
4. Gerald B. Sheblé, Daniel Berleant, and Robert Thomas (Cornell), "Market Interactions and Market Power," PSERC, June 1, 2000 – May 31, 2001, \$70,000 (\$60,000 ISU). (\$40,000).
5. Gerald B. Sheblé and Leigh Tesfatsion, "Computer Simulation of Electric Marketplaces Using Artificial Adaptive Agents," National Science Foundation, \$309,683, September 1, 1998 - August 31, 2001, (\$154,842).

Principal Research Stem Areas of Interest:

1. Markets
2. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Auctions
2. Bidding
3. Computer simulation
4. Cost analysis
5. Demand side management
6. Distributed resources
7. Electricity trading
8. Energy management
9. Operations
10. Optimization
11. Options
12. Planning

13. Pricing
14. Reliability Assessment
15. Risk assessment
16. Risk management
17. Computer modeling
18. Decision analysis
19. Intelligent systems
20. Multi-agent systems
21. Software agents
22. Unit commitment
23. Computational techniques
24. Fuzzy logic
25. Game theory
26. Genetic algorithms
27. Probability analysis
28. Reliability
29. Software engineering
30. System engineering
31. Artificial intelligence
32. Computer applications
33. Data analysis
34. Information technology
35. Markets
36. Neural networks
37. Nonlinear systems
38. Outage management
39. Power system analysis
40. Programming
41. Security assessment
42. Software development
43. Systems
44. Ancillary services
45. Distribution automation
46. Economic dispatch
47. Economics
48. FACTS
49. Forecasting
50. Load forecasting
51. Load modeling
52. Maintenance strategies
53. Parameter estimation
54. Power quality
55. Simulation

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Auction Mechanisms
2. Systems engineering supply chain management
3. Complex adaptive systems

Marcelo Simoes

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Statement of Research Interests:

I see a current worldwide need for research towards the development of the high-power end of power electronics. Mainly FACTS, active filters, and advanced distribution systems (to bridge the gap to power systems), renewable energy systems, distributed power, energy storage, power quality, signal processing, information technology and intelligent control.

Listed Keywords Describing Research Interests:

1. Intelligent systems
2. Fuel cells
3. Neural networks
4. Power electronics
5. Renewable energy

Selected Publications:

1. M.R.G. Meireles, P.E.M. Almeida and M. Godoy Simões, "A Comprehensive review for industrial applicability of artificial neural networks" – Accepted for Publication – IEEE Transactions on Industrial Electronics.
2. M. Godoy Simões, Petronio Vieira Jr, "A High torque low-speed multi-phase brushless machine – A Perspective application for electric vehicles" IEEE Transactions on Industrial Electronics, October/ 2002, vol. 49, no. 5 pp. 1154 –1164
3. M. Godoy Simões, N. N. Franceschetti, "Fuzzy optimization based control of a solar array system" IEE Proceedings - Electric Power Applications, September 1999, vol. 146, Issue 5, pp. 552-558, Sept. 1999.
4. M. Godoy Simões, Bimal K. Bose and Ronald J. Spiegel, "Design and performance evaluation of a fuzzy-logic-based variable-speed wind generation system" IEEE Transactions on Industry Applications, vol. 33, pp. 956-965, July/August 1997.
5. M. Godoy Simões, Bimal K. Bose and Ronald J. Spiegel, "Fuzzy logic based intelligent control of a variable speed cage machine wind generation system," IEEE Transactions on Power Electronics, vol. 12, pp. 87-95, Jan. 1997

Selected Research Projects:

1. CAREER: Intelligent Based Performance Enhancement Control of Micropower Energy Systems, NSF.
2. REU – Research Experience for Undergraduate Student: Fuel Cell Inverter, NSF.
3. Smart Sensor Development for Power Transmission and Distribution, PSERC.

Principal Research Stem Areas of Interest:

1. Systems
2. T&D technologies

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Computer modeling
2. Electric machinery
3. Fuzzy logic
4. Fuel cells
5. Neural networks
6. Power electronics
7. Renewable energy

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Vector control
2. Induction generators
3. Digital signal processing

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Statement of Research Interests:

Regulatory reform issues in electricity and telecommunications, Design of auctions and wholesale markets.

Listed Keywords Describing Research Interests:

1. Auctions
2. Bidding
3. Cost analysis
4. Deregulation policies
5. Economics
6. Policy analysis
7. Pricing
8. Restructuring policies
9. Risk assessment

Selected Publications:

1. "Folk Theorems on Transmission Open Access: Proofs and Counterexamples," with S. Oren, P. Varaiya and F. Wu, *Journal of Regulatory Economics*, 10:5-23,(1996).
2. "The Introduction of Direct Access in New Zealand's Electricity Market," with Mario Bergara, Vol. 6, No.2., *Utility Policy*, 1997: 97-106.
3. "Political Institutions and Electric Utility Performance: A Cross Nation Analysis," with Mario Bergara and Witold Henisz, Vol. 40, *California Management Review*, 1998:18+
4. "Towards a Property Rights Approach to Communications Spectrum", with C. Cardilli, Vol. 16, No.1 *Yale Journal of Regulation*, 1999: 53-84.
5. "Structure, Strategy and Regulation: Telecommunications in the New Economy," with R. deFigueiredo, , *Detroit Law Review*, 2000.

Principal Research Stem Areas of Interest:

1. Markets

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Auctions
2. Bidding
3. Cost analysis
4. Deregulation
5. Economics
6. Policy analysis
7. Pricing
8. Restructuring
9. Risk assessment

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Statement of Research Interests

- Effects of market economics on power system engineering and operations.
- Experimental economics as a tool for evaluating system effects on markets for real power and ancillary services.
- Unit commitment with full AC power flow constraints.
- Optimal power flow with dynamic security constraints.

Listed Keywords Describing Research Interests:

1. Auctions
2. Bidding
3. Complex systems
4. Computer applications
5. Control systems
6. Deregulation policies
7. Dynamics
8. Economic dispatch
9. Security assessment
10. Software agents
11. Stability
12. System engineering
13. Unit commitment
14. Visualization
15. Voltage collapse

Additional Keywords Describing Research Interests:

1. Controls

Selected Publications:

1. "Thermal unit commitment with a nonlinear AC power flow network model", Carlos E. Murillo-Sanchez, Robert J. Thomas, a paper presented at and published in the proceedings of the Discrete Mathematics and Theoretical Computer Science (DIMACS) Workshop on the Next Generation of Unit Commitment Models, September 27-28, 1999, Rutgers University, Piscataway, NJ
2. "Experimental Tests of the Efficiency of Competitive Markets for Electric Power using PowerWeb", W. Schulze, S. Ede, R. Zimmerman, J. Bernard, T. Mount, R.J. Thomas, R. Schuler, Papers and Proceedings of the AEA Annual Meeting, Jan 2000, Boston, MA
3. "A Stability-Constrained Optimal Power Flow", D. Gan, R.J. Thomas, R. Zimmerman published in the *IEEE Power Engineering Society Transactions on Power Systems*, 1999

Selected Research Projects:

1. Development of bidding agents for electric power system auction markets
2. Methods for assigning reserves based on their location in a network
3. Visualization methods for large data sets

Principal Research Stem Areas of Interest:

1. Markets
2. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Complex Systems
2. Computer applications
3. Controls
4. Deregulation policies
5. Economic dispatch
6. Dynamics
7. Systems
8. Systems engineering
9. Visualization

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Statement of Research Interests

Professor Thorp is interested in the protection and control of large-scale-power systems including algorithms for digital protection, adaptive relaying, and real-time control of power systems using measurements obtained from microprocessor relays. In addition, he studies the complicated dynamical behavior of power systems including the generation of "fractals" by such systems, and the mechanisms of cascading disturbances.

Listed Keywords Describing Research Interests:

1. Protection systems

Selected Publications:

1. J. Chen, J. S. Thorp, and M. Parashar, "Analysis of Electric Power System Disturbance Data," Hawaii International Conference on System Sciences (HICSS-34), Maui, Hawaii, January 2001.
2. D. V. Coury, J. S. Thorp, K. M. Hopkinson, and K. P. Birman, "Agent Technology Applied to Adaptive Relay Setting for Multi-Terminal Lines," IEEE Power Engineering Society Summer Meeting, Seattle, Washington, July 2000.
3. C-W Liu and J. S. Thorp, "New Methods for Computing Power System Dynamic Response for Real-Time Transient Stability Prediction", IEE Trans. on Circuits and Systems I: Fund. Theory & Appl., Vol. 47, No. 3, March 2000, pp. 324-337.
4. J S Thorp and A. G. Phadke, "Protecting Power Systems in the Post-Restructuring Era, IEEE Computer Applications in Power, Vol. 12 No. 1, January 1999, pp. 33-37.
5. J.S. Thorp, C.E. Seyler and A. G. Phadke, "Electromechanical Wave Propagation in Large Electric Power Systems," IEEE Trans. on Circuits and Systems I: Fund. Theory & Appl. Vol. 45, No. 6, June 1998, pp.614-22.

Selected Research Projects:

1. Formulation of Prescriptive Approaches to Prevention of Cascading Network Failures (EPRI/DOE)
2. Electromechanical Wave Propagation in Large Electric Power Systems (National Science Foundation)

Principal Research Stem Areas of Interest:

1. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Protection systems
2. Protection

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Statement of Research Interests:

Advanced electric machines and power electronics, power quality, wind power, fault diagnosis of electric machineries, and electric and hybrid vehicles.

Listed Keywords Describing Research Interests:

1. Electric machinery
2. Electric vehicles
3. Fault analysis
4. Inverters
5. Motors
6. Power electronics
7. Fuzzy logic
8. Generation
9. Wind energy
10. Transformers

Selected Publications:

1. S.M.R. Rafiei, R. Ghazi, H.A. Toliyat, and T. Gopalarathnam, "An Optimal and Flexible Control Strategy for Active Filtering and Power Factor Correction under Non-Sinusoidal Line Voltage," IEEE Transactions on Power Delivery, Vol. 16, No. 2, Apr. 2001, pp. 297-305.
2. S. Kwak, and H.A. Toliyat, "Optimized Power Distribution to Minimize the Power Ratings of Paralleled Rectifiers, The IEE Electronics Letters, Vol. 40, No. 5, March 2004, pp. 336-338.
3. M. Abolhassani, H.A. Toliyat, and P.N. Enjeti, "Integrated Doubly-Fed Electric Alternator/Active Filter (IDEA), A Total Energy Crisis and Power Quality Solution for Wind Energy Conversion Systems," Proceedings of the IEEE-IAS'04, Seattle, WA, October 3-7, 2004.
4. M. Haji, and H.A. Toliyat, "Pattern Recognition – A Technique for Induction Machines Rotor Broken Bar Detections," IEEE Transactions on Energy Conversion, Vol. 16, No. 4, Dec. 2001, pp. 312-317.
5. S. Kwak, and H.A. Toliyat, "Design and Performance Comparisons of Two Multi-drive Systems with Unity Power Factor," IEEE Transactions on Power Delivery, Vol. 20, No. 1, January 2005, pp. 417-426.

Selected Research Projects:

1. Wind Power Generations
2. Just-In-Time Maintenance of Power Plants
3. Flywheel Energy Storage Systems
4. Adjustable Speed Motor Drives
5. Measurements of Electrical Power Inputs to Variable Speed Motors and their Solid State Power Converters

Principal Research Stem Areas of Interest:

1. T&D technologies

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Wind power
2. Electric machinery
3. Electric vehicles
4. Fault analysis
5. Power electronics
6. Power system stabilizers

Kevin Tomsovic

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Statement of Research Interests:

My research focuses on the development of optimization and intelligent system methods for large complex engineered systems, primarily the electric power system. The power system consists of a vast array of devices that interact, directly through electrical connection and indirectly through information processing. The engineering concerns are how to design and operate this complex system to meet economic, reliability and social objectives and how to model the interactions between the flow of information, the physical system phenomena, and the desired performance. Modern optimization and intelligent system methods show promise in their ability to address the complexities and uncertainties inherent to such a large scale system.

Listed Keywords Describing Research Interests:

1. Intelligent systems
2. Optimization
3. Communications
4. Distributed resources
5. Security assessment
6. Distribution systems
7. Fuzzy logic
8. Control systems
9. Unit commitment

Additional Keywords Describing Research Interests:

1. Modeling investment dynamics and long-term planning
2. Communication system modeling
3. Estimation of security margins
4. Price forecasting

Selected Publications:

1. A. Sittithumwat and K. Tomsovic, "Dynamic Security Margin Estimation with Preventive Control Using Artificial Neural Networks," *International Energy Journal - AIT*, in press, selected from the *2004 Electricity Supply Industry in Transition: Issues and Prospects for Asia*, Bangkok, Thailand, Jan. 2004, pp. 1-1:1-11.
2. A. Dimitrovski and K. Tomsovic, "Risk Assessment using Boundary Load Flow Solutions," *International Journal of Engineering Intelligent Systems*, in press, and also in *Proceedings of the 2003 International Conference on Intelligent System Applications to Power Systems*, Lemnos, Greece, Sept. 2003, pp. 1-6.
3. X. Yu and K. Tomsovic, "Application of Linear Matrix Inequalities for Load Frequency Control with Communication Delays," *IEEE Transactions on Power Systems*, Vol. 19, No. 3, Aug. 2004, pp. 1508-1515.

4. M. Vaziri, K. Tomsovic and A. Bose, "Numerical Analyses of a Directed Graph Formulation of the Multistage Distribution Expansion Problem," *IEEE Transactions on Power Delivery*, Vol. 19, No. 3, July 2004, pp. 1348-1354.
5. T. Peng and K. Tomsovic, "Congestion Influence on Bidding Strategies in an Electricity Market," *IEEE Transactions on Power Systems*, Vol. 18, No. 3, August 2003, pp. 1054-1061.

Selected Research Projects:

1. Modeling the Interaction between the Technical, Social, Economic and Environmental Components of Large Scale Electric Power Systems, Sponsor: NSF, co-PIs: A. Ford, A. Bose, Ken Casavant, L. Lutzenhiser
2. Towards an Understanding of Deregulated Electricity Markets through Time Series Analysis, Sponsor: NSF, co-PI: Z. Obradovic.
3. Integrated Security Analysis, Sponsor: PSerc, co-PIs A. Bose, P. Sauer.
4. Increasing Transparency of Transmission Constraints on the Electricity Trading Market, Sponsor: NSF, co-PIs: A. Bose, R. Podmore and R. Thomas.

Principal Research Stem Areas of Interest:

1. Systems
2. Markets
3. T&D technologies

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Intelligent systems
2. Optimization
3. Distributed control
4. Fuzzy logic
5. Distributed resources

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Modeling investment dynamics and long-term planning
2. Communication system modeling
3. Estimation of security margins
4. Price forecasting

S. S. (Mani) Venkata

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Personal Web Site: http://ecpe.ee.iastate.edu/newweb/faculty/Venkata_S_S.htm

Statement of Research Interests:

Dr. Venkata's research interests include power quality and reliability, power electronic applications to power systems, automated distribution system planning and automation, intelligent applications to power systems, six-phase transmission, protection, and education.

Listed Keywords Describing Research Interests:

1. Distribution systems
2. Distributed resources
3. Distribution automation
4. Information technology
5. Intelligent systems
6. Load modeling
7. Outage management
8. Parallel algorithms
9. Power quality
10. Protection systems
11. Reliability assessment
12. Risk assessment
13. Substation automation

Additional Keywords Describing Research Interests:

1. Cascading failures

Selected Publications:

1. N. Balijepalli, **S. S. Venkata**, C. W. Richter, R. D. Christie and V. Longo, "Distribution System Reliability Assessment Due to Lightning Storms", IEEE Transactions on Power Delivery. (Accepted for publication).
2. N. Balijepalli, **S. S. Venkata**, and R. D. Christie, "Modeling and Analysis of Distribution Reliability Indices", IEEE Transactions on Power Delivery, Vol.19, No.4, October 2004, pp. 1950-55.
3. F. Chen, K. B. Athreya, V. V. Sastry and **S. S. Venkata**, "Function Space Valued Markov Model for Electric Arc Furnace", IEEE Transactions on Power Systems, Vol.19, No.2, May 2004, pp. 826-33.
4. **S. S. Venkata**, A. Pahwa, R. E. Brown and R. D. Christie, "What Future Distribution Engineers Need to Learn", IEEE Transactions on Power Systems, Vol.19, No.1, February 2004, pp.17-23.
5. N. Balijepalli, **S. S. Venkata**, and R. D. Christie, "Predicting Distribution System Performance against Regulatory Reliability Standards", IEEE Transactions on Power Delivery, Vol.19, No.1, January 2004, pp. 350-56.

Selected Research Projects:

1. V. V. Sastry (P.I.), V. Ajarapu and **S. S. Venkata** (Co-PI), **National Science Foundation (CCLI)**, \$ 200,000, "A Novel Undergraduate Power Electronics Systems and Electric Drives", 9/1/00-8/31/02.
2. **S. S. Venkata** (P.I.), V. V. Sastry and K. B. Athreya (Co-PI), **National Science Foundation**, \$ 75,000, "Action Adaptive Modeling of Highly Nonlinear Loads", 9/1/00-8/31/01.
3. **S. S. Venkata** and G. T. Heydt (P.I.), **National Science Foundation**, \$ 115,000, "Chaotic Modeling of Highly Nonlinear Loads", 5/16/98-5/15/00.

Principal Research Stem Areas of Interest:

1. Systems
2. T&D technologies
3. Markets

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Distribution
2. Computer applications
3. Custom power
4. Demand side management
5. Electric machinery
6. EMTP applications and modeling
7. Energy management
8. Load forecasting
9. Maintenance strategies
10. MicroGrids
11. Motor drives
12. Power electronics
13. Probability analysis
14. Renewable energy
14. Transmission
15. Wind energy
16. Wireless communication

Additional Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Engineering education
2. Distribution engineers training

Vijay Vittal

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Department: Electrical Engineering
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Statement of Research Interests:

Vittal's research interests are in the area of power system dynamics and control. Over the years he has been actively involved with the development of the Transient Energy Function method for dynamic security assessment. His current research interests are in the area of robust control analysis and design, risk based security assessment, development of adaptive self healing techniques for power systems, use of phasor based measurement in power system security analysis, and application of the method of normal forms to power systems.

Listed Keywords Describing Research Interests:

1. Dynamics
2. Complex systems
3. Control systems
4. Control theory
5. Nonlinear systems
6. Oscillations
7. Risk assessment
8. Power system analysis
9. Motors

Selected Publications:

1. E. Kyriakides, G.T. Heydt, V. Vittal, "On-line Estimation of Synchronous Generator Parameters Using a Damper Current Observer and a Graphic User Interface," IEEE Transactions on Energy Conversion, Vol. 19, No. 3, pp. 499-507, September 2004.
2. P. Kundur, J. Paserba, V.Ajjarapu, G. Andersson, A. Bose, C. Canizares, N. Hatziargyriou, D. Hill, A. Stankovic, C. Taylor, T. Van Cutsem, V.Vittal, "Definition and Classification of Power System Stability, IEEE/CIGRE Joint Task Force on Stability Terms and Definitions Report," IEEE Transactions on Power Systems, Vol. 19, No. 3, pp.1387-1401, August 2004.
3. P. Sauer, G.T. Heydt, V. Vittal, "The State of Electric Power Engineering Education," IEEE Transactions on Power Systems, Vol. 19, No.1, pp 5-8, February 2004.
4. H. You, V. Vittal, X. Wang, "Slow Coherency Based Islanding," IEEE Transactions on Power Systems, Vol. 19, No. 1, pp 483-491, February 2004.
5. Vittal, V., "Emergency Control and Special Protections Systems in Large Electric Power Systems," Stability and Control of Dynamical Systems with Applications, 293-313, Birkhäuser, Boston, 2003.

Selected Research Projects:

1. Integration of Mechanical Sensors to Enhance Power System Operation (National Science Foundation)
2. Adaptive Islanding in Power Systems (CERTS)
3. Security enhancement through non disruptive load control (PSERC)

4. Extended state estimation for synchronous generator parameters (PSERC)
5. Detection, Mitigation, and Prevention of cascading events (PSERC)

Principal Research Stem Areas of Interest:

1. Systems

Listed Keywords Describing Areas of Interest in Delivering Professional Development Instruction:

1. Operation
2. Dynamics
3. Computer modeling
4. Control theory
5. Transient stability

Ray Zimmerman

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Personal Web Site: <http://www.pserc.cornell.edu/ray/>

Statement of Research Interests:

Interactions between the economic and engineering aspects of electric power system restructuring. Software tools, especially Internet-based, for education and research.

Listed Keywords Describing Research Interests:

1. Auctions
2. Computer applications
3. Market design
4. Market power
5. Optimization
6. Software development
7. Unit commitment
8. Visualization

Additional Keywords Describing Research Interests:

1. Internet applications
2. Software tools

Selected Publications:

1. "An Engineering Approach to Monitoring Market Power in Restructured Markets for Electricity", with C. Murillo-Sánchez, S. Ede, T. Mount, R. Thomas, Proceedings of 24th IAEE International Conference, April 25-27, 2001, Houston, TX, USA.
2. "Stability-Constrained Optimal Power Flow", with D. Gan, R. Thomas, IEEE Transactions on Power Systems, Vol. 15, No. 2, May 2000, pp. 535-540.
3. "A Web-Based Platform for Experimental Investigation of Electric Power Auctions", with R. Thomas, D. Gan, C. Murillo-Sánchez, Decision Support Systems, Vol. 24, Nos. 3 & 4, January 1999, pp. 193-205.

Selected Research Projects:

1. PowerWeb (<http://www.pserc.cornell.edu/powerweb/>)
2. MATPOWER (<http://www.pserc.cornell.edu/matpower/>)
3. Transfer Capability Calculator (<http://www.pserc.cornell.edu/tcc/>)

Principal Research Stem Areas of Interest:

1. Markets