Curriculum Vitae

Name: Kai Sun
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EDUCATION

2004	Ph.D. in Control Science and Engineering	Tsinghua University, Beijing, China
2001	M.S. in Control Science and Engineering	Tsinghua University, Beijing, China
1999	B.S. in Automation	Tsinghua University, Beijing, China

WORK EXPERIENCE

2017 - Present	**Associate Professor** with Dept. of EECS, University of Tennessee, Knoxville, TN
2012 - 2017	**Assistant Professor** with Dept. of EECS, University of Tennessee, Knoxville, TN
2012 - 2014	**Consulting Employee** with the Electric Power Research Institute (EPRI), Knoxville, TN
2007 - 2012	**Project Manager** in Grid Operations and Planning, EPRI, Palo Alto, CA
2006 - 2007	**Research Associate** with the Dept. of EE, Arizona State University, Tempe, AZ
2005	**Postdoctoral Fellow** with the Dept. of ECE, University of Western Ontario, Canada

AWARDS AND HONORS

2016	**Most Valuable Players Award of NASPI** (North American Synchrophasor Initiative) by the Control Room Solution Task Team for development of the online Test Cases Library on Oscillation Source Location
2016	**NSF CAREER Award** for "Integrated Research and Education in Nonlinear Modal Decoupling and Control for Resilient Interconnected Power Systems"
2016	**Professional Promise in Research Award** by the College of Engineering, University of Tennessee - Knoxville
2015	**Best Papers Award** by IEEE PES General Meeting for paper "Application of Adomian Decomposition for Multi-Machine Power System Simulation"
2014	**Best Papers Award** by IEEE PES General Meeting for paper "A New Approach to Optimization of Dynamic Reactive Power Sources Addressing FIDVR Issues"
2009	**EPRI Chauncey Award** (Top honor of EPRI employees) for contributions in "Advanced Tools for Reliable Operation and Robust Planning"
2008	**EPRI Technology Innovation Excellence Award** for "establishing EPRI as a thought leader in cascading failures of power grids and creating a new project set for the 'Grid Operation' Program in Power Delivery and Utilization Sector"

2006 "**100 Best PhD Dissertations of China**" **Award** from the Ministry of Education of China for PhD dissertation "An OBDD-based Three-phase Method for Searching for Splitting Strategies of Large-scale Power Networks against Blackouts"

RESEARCH GRANTS

University of Tennessee

2016-2021	NSF	CAREER Award: Integrated Research and Education in Nonlinear Modal Decoupling and Control for Resilient Interconnected Power Systems (ECCS-1553863)	PI	$500,000
2016-2019	NSF	A Semi-Analytical Framework for Faster Deterministic and Stochastic Power System Simulations (ECCS-1610025)	PI	$303,863
201-2018	GEIRINA	Measurement-based Voltage Stability Assessment	PI	$70,351
2015-2016	Eleon Energy	Survey on R&D needs for parallel power system restoration	PI	$30,000
2015-2016	eMIT	Electromagnetic Transient Simulation	PI	$46,421
2015-2017	ORNL	Parallel power system simulation	PI	$109,119
2013-2016	ORNL	Optimal dynamic VAR management involving renewables against voltage security issues	PI	$172,714
2013-2014	NEC Lab	Microgrid stability and control	PI	$60,000
2013-2014	EPRI	Undervoltage load shedding	PI	$49,183
2012-2014	DOE/EPRI	High-Performance Hybrid Simulation/ Measurement Based Tools for Proactive Operator Decision Support: Measurement-based Stability Assessment Tool (DE-FOA-0000729)	PI	$350,618
2012-	CURENT	Power system modeling, control and testbeds	Co-PI	$420,666

TEACHING EXPERIENCE

University of Tennessee, Knoxville

- ECE 325 (Electric Energy System Components): Fall 2015, Fall 2016
- ECE 421 (Electric Energy Systems): Fall 2013, Fall 2014, Fall 2017
- ECE 422 (Power System Operations & Planning): Spring 2014, Spring 2015
- ECE 521 (Power Systems Analysis I): Fall 2013
- ECE 522 (Power Systems Analysis II): Spring 2013, Spring 2014, Spring 2017
- ECE 620 (Ultra-wide-area Resilient Electrical Energy Transmission Networks): Fall 2016
- ECE 692 (Advanced Topics on Power System Stability): Spring 2016

Others

- Guest lecturer for Stanford University's EE392N (Intelligent Energy Systems): Spring 2012

ALUMNI (MAJOR ADVISOR)

1. Fengkai Hu (now with Siemens Industry, USA), Ph.D. in Electrical Engineering, July 2016
   Dissertation: *Real-time Voltage Stability Monitoring and Control for Load Areas: A Hybrid Approach*
2. Hira Amna Saleem (now with Shell, Pakistan), M.S. in Electrical Engineering, May 2014
   Master's Thesis: *Microgrid Modeling and Grid Interconnection Studies*
3. Weihong Huang, M.S. in Electrical Engineering, Dec 2014
   Master's Thesis: *A New Approach to Optimization of Dynamic Reactive Power Sources Addressing FIDVR Issues*

CURRENT GRADUATE STUDENTS

1.	Bin Wang	Ph.D. candidate	Fall 2012 - Present
2.	Nan Duan	Ph.D. candidate	Fall 2013 - Present
3.	Weihong Huang	Ph.D. candidate	Spring 2014 - Present
4.	Yongli Zhu	Ph.D. student	Spring 2014 - Present
5.	Denis Osipov	Ph.D. student	Spring 2014 - Present
6.	Wenyun Ju	Ph.D. student	Fall 2014 - Present
7.	Xin Xu	Ph.D. student	Fall 2016 - Present
8.	Yang Liu	Ph.D. student	Spring 1017 - Present
9.	Tianwei Xia	Ph.D. student	Fall 2017 - Present

ADVISED POSTDOCRATES

1. Dr. Miao Fan (now with Siemens Industry, USA), 2013
2. Dr. Junjian Qi (now with Argonne National Laboratory), 2013-2015
3. Dr. Rui Yao, 2016 - Present
4. Dr. Chengxi Liu, 2016 - Present

PROFESSIONAL ACTIVITIES

2016 - Present **Associate Editor** of *IET Generation, Transmission & Distribution*

2016 - Present **Guest Editor** of *IET Generation, Transmission & Distribution - Special Issue on Smart Grid Voltage Control*

2016 - Present **Sigma Xi member**

2015 - Present **Editor** of *Protection and Control of Modern Power Systems*

2013 - Present **IEEE senior member**

2012 - Present **Editor** of *IEEE Transactions on Smart Grid*

PATENTS

1. Nan Duan, **Kai Sun**, "Transient Stability Simulation and Operation of Power Systems," US Patent Application, No. 14/956,076, filed in Dec. 2015.
2. **Kai Sun**, Kyeon Hur, Pei Zhang, "Application of Phasor Measurement Units (PMU) for Controlled System Separation," US Patent No. 8/606,422, issued in Dec. 2013 (Taiwan Patent No. I426677, Feb. 2014).
3. **Kai Sun**, Qiang Zhou, "Application of Phase-Locked Loop (PLL) in Oscillation Monitoring for Interconnected Power Systems," US Patent No. 13/280,458, issued in April 2013.
4. Qianchuan Zhao, **Kai Sun**, Da-Zhong Zheng, Jin Ma, Qiang Lu, "Solution to Preventing Power Systems from Collapse in Case of Catastrophe," Chinese Patent No. 03122884, issued in May 2003.

PUBLICATIONS

Book Chapters and Invited Papers

1. **Kai Sun**, "Coherency Theory - An Excellent Reference on the Subject" (Invited Book Review of "Power System Coherency and Model Reduction" by Joe H. Chow, et al.) IEEE Power and Energy Magazine, vol. 12, No. 1, pp. 102-104, Jan 2014.
2. **Kai Sun**, Yunhe Hou, Wei Sun, Junjian Qi, "Power System Control under Cascading Failures: Understanding and Mitigation of Cascading Failures and System Restoration", Wiley, to be published in 2017.
3. **Kai Sun**, chapter "Measurement-based Voltage Stability Assessment Techniques" for Standard Handbook for Electrical Engineers (17th edition), McGraw-Hill, to be published in 2017.

Published/Accepted Transaction Papers:

1. Weihong Huang, **Kai Sun**, Junjian Qi, Jiaxin Ning, "Optimization of Dynamic Reactive Power Sources Using Mesh Adaptive Direct Search," *IET Generation, Transmission & Distribution*, accepted – in press.
2. Bin Wang, Chengxi Liu, **Kai Sun**, "Multi-Stage Holomorphic Embedding Method for Calculating the Power-Voltage Curve," *IEEE Transactions on Power Systems*, accepted – in press.
3. Weihong Huang, **Kai Sun**, Junjian Qi, Jiaxin Ning, "Optimal Allocation of Dynamic Var Sources Using the Voronoi Diagram Method Integrating Linear Programing," *IEEE Transactions on Power Systems*, accepted - in press
4. Daham Min, Seog-joo Kim, Sangsoo Seo, Young-Hwan Moon, **Kai Sun**, Joe H. Chow, Kyeon Hur, "Computing Safety Margins of a Generation Rejection Scheme: A Framework for Online Implementation," *IEEE Transactions on Smart Grid*, accepted – in press.
5. Junjian Qi, **Kai Sun**, Jianhui Wang, Hui Liu, "Dynamic State Estimation for Multi-Machine Power System by Unscented Kalman Filter with Enhanced Numerical Stability," *IEEE Trans. Smart Grid*, accepted - in press.
6. Tao Ding, **Kai Sun**, Can Huang, Zhaohong Bie, Fangxing Li, "Mixed Integer Linear Programming-based Splitting Strategies for Power System Islanding Operation Considering Network Connectivity," *IEEE Systems Journal*, accepted - in press.

7. Rui Yao, Shaowei Huang, **Kai Sun**, Feng Liu, Xuemin Zhang, Shengwei Mei, Wei Wei, Lijie Ding, "Risk Assessment of Multi-timescale Cascading Outages based on Markovian Tree Search," *IEEE Transactions on Power Systems*, vol. 32, No. 4, pp. 2887 - 2900, July 2017.
8. Wenyun Ju, **Kai Sun**, Junjian Qi, "Multi-Layer Interaction Graph for Analysis and Mitigation of Cascading Outages," *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, vol. 7, No. 2, pp. 239-249, June 2017.
9. Tao Ding, **Kai Sun**, Qingrun Yang, Abdul Wahab Khan, Zhaohong Bie, "Mixed Integer Second Order Cone Relaxation with Dynamic Simulation for Proper Power System Islanding Operations," *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, vol. 7, No. 2, pp.295-306, June 2017
10. Junjian Qi, Wenyun Ju, **Kai Sun**, "Estimating the Propagation of Interdependent Cascading Outages with Multi-Type Branching Processes," *IEEE Transactions on Power Systems*, vol. 32, No. 2, pp. 1212-1223, March 2017
11. Bin Wang, Xiaowen Su, **Kai Sun**, "Properties of the Frequency-Amplitude Curve," *IEEE Trans. Power Systems*, vol. 32, No. 1, pp. 826-827, January 2017.
12. Bin Wang, **Kai Sun**, "Location Methods of Oscillation Sources in Power Systems: A Survey," *Journal of Modern Power Systems and Clear Energy*, vol. 5, No. 2, pp. 151-159, 2017.
13. Nan Duan, **Kai Sun**, "Power System Simulation Using the Adomian Decomposition Method," *IEEE Trans. Power Systems*, vol. 32, no. 1, pp. 430-441, January 2017.
14. Junjian Qi, Weihong Huang, **Kai Sun**, Wei Kang, "Optimal Placement of Dynamic Var Sources by Using Empirical Controllability Covariance," vol. 32, no. 1, pp. 240-249, January 2017.
15. Huimin Gao, Xiaogao Xie, Jianmin Zhang, Chenxi Wu, **Kai Sun**, "Second-order oscillation mode study of hydropower system based on linear elastic model and modal series method," *International Transactions on Electrical Energy Systems*, vol. 27, No. 1, January 2017 (DOI: 10.1002/etep.2233).
16. Feifei Bai, Yong Liu, Yilu Liu, **Kai Sun**, Navin Bhatt, Alberto Del Rosso, Evangelos Farantatos and Xiaoru Wang, "A measurement-based approach for power system instability early warning," *Protection and Control of Modern Power Systems*, pp. 1-4, 2016 (DOI:10.1186/s41601-016-0014-0).
17. Bin Wang, **Kai Sun**, "Formulation and Characterization of Power System Electromechanical Oscillations," *IEEE Trans. Power Systems*, vol. 61, no. 6, pp. 5082-5093, November 2016.
18. Fengkai Hu, **Kai Sun**, Alberto Del Rosso, Evangelos Farantatos, Navin Bhatt, "Measurement-Based Real-Time Voltage Stability Monitoring for Load Areas," *IEEE Trans. Power Systems*, vol. 31, no. 4, pp. 2787 – 2798, July 2016.
19. **Kai Sun**, Junjian Qi, Wei Kang, "Observability and Dynamic State Estimation for Power System Stability Monitoring Using Synchrophasors," *Control Engineering Practice*, vol. 53, pp. 160–172, August 2016.
20. Rui Yao, Shaowei Huang, **Kai Sun**, Feng Liu, Xuemin Zhang, Shengwei Mei, "A Multi-timescale Quasi-Dynamic Model for Simulation of Cascading Outages," *IEEE Trans. Power Systems*, vol. 31, no. 4, pp. 3189 – 3201, July 2016.
21. Feifei Bai, Lin Zhu, Yilu Liu, Xiaoru Wang, **Kai Sun**, Yiwei Ma, Mahendra Patel, Evangelos Farantatos, Navin Bhatt, "Design and Implementation of a Measurement-based Adaptive Wide-Area Damping Controller Considering Time Delays," *Electric Power Systems Research*, vol. 130, pp. 1-9, January 2016.
22. Feifei Bai, Yong Liu, Yilu Liu, **Kai Sun**, Navin Bhatt, Alberto Del Rosso, Evangelos Farantatos, Xiaoru Wang, "Measurement-Based Correlation Approach for Power System Dynamic Response Estimation," *IET Generation, Transmission & Distribution*, vol. 9, no. 12, pp. 1474-1484, Sep. 2015.

23. Yong Liu, **Kai Sun**, Yilu Liu, "A Measurement-based Power System Model for Dynamic Response Estimation and Instability Warning," *Electric Power Systems Research*, vol. 124, pp. 1-9, 2015.
24. Junjian Qi, **Kai Sun**, Wei Kang, "Optimal PMU Placement for Power System Dynamic State Estimation by Using Empirical Observability Gramian," *IEEE Trans. Power Systems*, vol. 30, pp. 2041-2054, July 2015.
25. Junjian Qi, **Kai Sun**, Shengwei Mei, "An Interaction Model for Simulation and Mitigation of Cascading Failures," *IEEE Trans. Power Systems*, vol. 30, no. 2, pp. 804-819, March 2015.
26. Chengxi Liu, **Kai Sun**, Zakir Hussain Rather, Zhe Chen, Claus Leth Bak, Paul Thøgersen, Per Lund, "A Systematic Approach for Dynamic Security Assessment and the Corresponding Preventive Control Scheme Based on Decision Trees," *IEEE Trans. Power Systems*, vol. 29, no. 2, pp. 717-730, March 2014.
27. **Kai Sun**, Qiang Zhou, Yilu Liu, "A Phase Locked Loop-based Approach to Real-time Modal Analysis on Synchrophasor Measurements," *IEEE Trans. Smart Grid*, vol. 5, no. 1, pp. 260-269, Jan. 2014.
28. **Kai Sun**, Kyeon Hur, Pei Zhang, "A New Unified Scheme for Controlled Power System Separation Using Synchronized Phasor Measurements," *IEEE Trans. Power Systems*, vol. 26, no. 3, pp. 1544-1554, Aug. 2011.
29. Chong Wang, Vijay Vittal, **Kai Sun**, "OBDD-Based Sectionalizing Strategies for Parallel Power System Restoration," *IEEE Trans. Power Systems*, vol. 26, no. 3, pp. 1426-1433, Aug. 2011.
30. Yunhe Hou, Chen-Ching Liu, **Kai Sun**, Pei Zhang, Shanshan Liu, Dean Mizumura, "Computation of Milestones for Decision Support during System Restoration," *IEEE Trans. Power Systems*, vol. 26 , no. 3, pp. 1399 – 1409, Aug. 2011.
31. **Kai Sun**, Stephen T. Lee, Pei Zhang, "An Adaptive Power System Equivalent for Real-time Estimation of Stability Margin using Phase-Plane Trajectories," *IEEE Trans. Power Systems*, vol. 26, pp. 915-923, May 2011.
32. Ruisheng Diao, **Kai Sun**, Vijay Vittal, Robert J. O'Keefe, Michael R. Richardson, Navin Bhatt, Dwayne Stradford, Sanjoy K. Sarawgi, "Decision Tree-Based Online Voltage Security Assessment Using PMU Measurements," *IEEE Trans. Power Systems*, vol. 24, pp. 832-839, May 2009.
33. **Kai Sun**, Siddharth Likhate, Vijay Vittal, V. Sharma Kolluri, Sujit Mandal, "An Online Dynamic Security Assessment Scheme using Phasor Measurements and Decision Trees," *IEEE Trans. Power Systems*, vol. 22, pp. 1935-1943, Nov 2007.
34. Ming Jin, Tarlochan S. Sidhu, **Kai Sun**, "A New System Splitting Scheme Based on the Unified Stability Control Framework," *IEEE Trans. Power Systems*, vol. 22, pp. 433-441, Feb 2007.
35. **Kai Sun**, Da-Zhong Zheng, Qiang Lu, "Searching for Feasible Splitting Strategies of Controlled System Islanding," *IEE Proceedings Generation, Transmission & Distribution*, vol. 153, pp. 89-98, Jan 2006.
36. **Kai Sun**, Da-Zhong Zheng, Qiang Lu, "A Simulation Study of OBDD-based Proper Splitting Strategies for Power Systems under Consideration of Transient Stability," *IEEE Trans. Power Systems*, vol. 20, pp. 389-399, Feb 2005.
37. Qianchuan Zhao, **Kai Sun**, Da-Zhong Zheng, Jin Ma, Qiang Lu, "A Study of System Splitting Strategies for Island Operation of Power System: A Two-phase Method Based on OBDDs," *IEEE Trans. Power Systems*, vol.18, pp.1556-1565, Nov 2003.
38. **Kai Sun**, Da-Zhong Zheng, Qiang Lu. "Splitting Strategies for Islanding Operation of Large-scale Power Systems Using OBDD-based Methods," *IEEE Trans. Power Systems*, vol.18, pp. 912-923, May 2003.
39. **Kai Sun**, Qianchuan Zhao, Da-Zhong Zheng, "A Hybrid Control for Autonomous Systems of Electric Power Supply," *Journal of Control Theory and Applications*, vol. 19, pp. 23-28, Feb 2002.

Conference Papers:

1. Nan Duan, Aleksandar Dimitrovski, Srdjan Simunovic, **Kai Sun**, Junjian Qi, Jianhui Wang, "Embedding Spatial Decomposition in Parareal in Time Power System Simulation," to be presented at 2017 IEEE ISGT Europe.
2. Yongli Zhu, Bin Wang, **Kai Sun**, "Damping Control for Power Systems Using Energy Storage," 29th Chinese Control and Decision Conference, Chongqing, China, May 28-30, 2017.
3. Wenyun Ju, Bin Wang, **Kai Sun**, "Can Nonlinear Electromechanical Oscillation be Analyzed Using an Equivalent SMIB System?" 2017 IEEE PES General Meeting
4. Y. Wang, H. Pulgar-Painemal, **K. Sun**, "Online analysis of voltage security in a microgrid using convolutional neural networks," 2017 IEEE PES General Meeting.
5. I.R. Cabrera, Bin Wang, **Kai Sun**, "A Method to Locate the Source of Forced Oscillations Based on Linearized Model and System Measurements," 2017 IEEE PES General Meeting.
6. Chengxi Liu, Bin Wang, **Kai Sun**, "Fast Power System Simulation Using Semi-Analytical Solutions Based on Pade Approximants," 2017 IEEE PES General Meeting.
7. Eric Abreut, Bin Wang, **Kai Sun**, "Semi-Analytical Fault-on Trajectory Simulation and Its Application in Direct Methods," 2017 IEEE PES General Meeting.
8. N. Duan, A. Dimitrovski, S. Simunovic, **K. Sun**, "Applying Reduced Generator Models in the Coarse Solver of Parareal in Time Parallel Power System Simulation," IEEE PES Innovative Smart Grid Technologies Europe (ISGT Europe) Conference, October 9-12, 2016, Ljubljana, Slovenia.
9. J. Qi, **K. Sun**, W. Kang, "Adaptive Optimal PMU Placement Based on Empirical Observability Gramian," IFAC Symposium on Non-Linear Control Systems (NOLCOS), August 23-25, 2016, Monterey, CA.
10. A. C. Teron, A. Bartlett, N. Duan, **K. Sun**, "Estimating the Nonlinear Oscillation Frequency of a Power System Using the Harmonic Balanced Method," IEEE PES General Meeting, July 17-21, 2016, Boston, MA.
11. D. Osipov, F. Hu, **K. Sun**, "Voltage Stability Margin Estimation for a Load Area Using a Three-Bus Equivalent," IEEE PES General Meeting, July 17-21, 2016, Boston, MA.
12. F. Hu, L. Yang, J. Wang, Y. Ma, **K. Sun**, L.M. Tolbert, F. Wang, "Measurement-based Voltage Stability Assessment and Control on CURENT Hardware Test Bed System," IEEE PES General Meeting, July 17-21, 2016, Boston, MA.
13. S. Maslennikov, B. Wang, Q. Zhang, F. Ma, X. Luo, **K. Sun**, E. Litvinov, "A Test Cases Library for Methods Locating the Sources of Sustained Oscillations," IEEE PES General Meeting, July 17-21, 2016, Boston, MA.
14. Y. Tong, J. Sun, **K. Sun**, P. Li, "Outsourcing Power System Simulations," IEEE GLOBECOM, December 6-10, 2015, San Diego, CA.
15. Y. Tong, J. Sun, **K. Sun**, "Privacy-preserving spectral estimation in smart grid," IEEE SmartGridComm Symposium, November 2-5, 2015, Miami, FL.
16. F. Bai, H. Liu, L. Zhu, Y. Liu, **K. Sun**, X. Wang, M. Patel, E. Farantatos, "A Measurement-based Control Input-output Signal Selection Approach to Damp Inter-area Oscillations," IEEE PES Asia-Pacific Power & Energy Engineering Conference (APPEEC), November 15-18, 2015, Brisbane, Australia.
17. T. Ding, **K. Sun**, F. Li, H. Sun, X. Zhang, "Graph Theory Based Splitting Strategies for Power System Islanding Operation," IEEE PES General Meeting, July 26-30, 2015, Denver, CO.

18. G. Gurrala, A. Dimitrovski, P. Sreekanth, S. Simunovic, M. Starke, **K. Sun**, "Application of Adomian Decomposition for Multi-Machine Power System Simulation," IEEE PES General Meeting, July 26-30, 2015, Denver, CO.
19. N. Duan, B. Wang, **K. Sun**, "Analysis of Power System Oscillation Frequency Using Differential Groebner Basis and the Harmonic Balance Method," IEEE PES General Meeting, July 26-30, 2015, Denver, CO.
20. Y. Zhu, R. Azim, H. A. Saleem, **K. Sun**, D. Shi, R. Sharma, "Microgrid Security Assessment and Islanding Control by Support Vector Machine," IEEE PES General Meeting, July 26-30, 2015, Denver, CO.
21. B. Wang, **K. Sun**, X. Su, "An Oscillation Decoupling Based Direct Method for Power System Transient Stability Analysis," IEEE PES General Meeting, July 26-30, 2015, Denver, CO.
22. W. Ju, J. Qi, **K. Sun**, "Simulation and Analysis of Cascading Failures on an NPCC Power System Test Bed," IEEE PES General Meeting, July 26-30, 2015, Denver, CO.
23. E. Farantatos, A. Del Rosso, N. Bhatt, **K. Sun**, Y. Liu, L. Min, C. Jing, J. Ning, M. Parashar, "A Hybrid Framework for Online Dynamic Security Assessment Combining High Performance Computing and Synchrophasor Measurements," IEEE PES General Meeting, July 26-30, 2015, Denver, CO.
24. M. Nakmali, D. Osipov, **K. Sun**, "A New Hybrid Approach to Thevenin Equivalent Estimation for Voltage Stability Monitoring," IEEE PES General Meeting, July 26-30, 2015, Denver, CO.
25. W. Huang, **K. Sun**, J. Qi, Y. Xu, "Voronoi Diagram Based Optimization of Dynamic Reactive Power Sources," IEEE PES General Meeting, July 26-30, 2015, Denver, CO.
26. N. Duan, **K. Sun**, "Application of the Adomian Decomposition Method for Semi-Analytic Solutions of Power System Differential Algebraic Equations," Powertech, June 29-July 2, 2015, Eindhoven, Netherlands.
27. R. Azim, **K. Sun**, F. Li, Y. Zhu, H. A. Saleem, D. Shi, R. Sharma, "A Comparative Analysis of Intelligent Classifiers for Passive Islanding Detection in Microgrids," Powertech, June 29-July 2, 2015, Eindhoven, Netherlands.
28. R. Azim, Y. Zhu, H. A. Saleem, **K. Sun**, F. Li, D. Shi, R. Sharma, "A Decision Tree Based Approach for Microgrid Islanding Detection," IEEE PES Innovative Smart Grid Technologies (ISGT) Conference, February 17-20, 2015, Washington DC.
29. A.D. Rosso, E. Farantatos, N. Bhatt, **K. Sun**, Y. Liu, C. Jing, J. Ning, "Hybrid Simulation/Measurement-Based Framework for Online Dynamic Security Assessment," CIGRE - The Grid of the Future Conference, October 19-21, 2014, Houston, TX.
30. **K. Sun**, W. Kang, "Observability and Estimation Methods Using Synchrophasor," The 19th World Congress of the International Federation of Automatic Control (IFAC), Cape Town, South Africa, August 24-29, 2014.
31. Feifei Bai, Yong Liu, Yilu Liu, **Kai Sun**, Xiaoru Wang, Navin Bhatt, Alberto Del Rosso, Evangelos Farantatos, "Measurement-Based and Modeling-Based Methods to Establish Input-Output Relationship for System Identification-Based Models," IEEE PES General Meeting, July 27-31, 2014, National Harbor, MD.
32. Yin Lei, Yong Liu, Gefei Kou, Bin Wang, Changgang Liu, **Kai Sun**, Yilu Liu, Kevin Tomsovic, Joe Chow, "A Study on Wind Frequency Control under High Wind Penetration on an NPCC System Model," IEEE PES General Meeting, July 27-31, 2014, National Harbor, MD.
33. B. Trento, B. Wang, **K. Sun**, and L. M. Tolbert, "Integration of Phase-Locked Loop Based Real-time Oscillation Tracking in Grid Synchronized Systems," IEEE PES General Meeting, July 27-31, 2014, National Harbor, MD.

34. F. Hu, **K. Sun**, et al, "An Adaptive Three-bus Power System Equivalent for Estimating Voltage Stability Margin from Synchronized Phasor Measurements," IEEE PES General Meeting, July 27-31, 2014, National Harbor, MD.
35. L. E. Bernal, F. Hu, **K. Sun**, E Farantatos, "Identification and Wide-area Visualization of the Centers of Oscillation for a Large-scale Power System," IEEE PES General Meeting, July 27-31, 2014, National Harbor, MD.
36. B. Wang, **K. Sun**, A. D. Rosso, E. Farantatos, N. Bhatt, "A Study on Fluctuations in Electromechanical Oscillation Frequencies of Power Systems," IEEE PES General Meeting, July 27-31, 2014, National Harbor, MD.
37. W. Huang, **K. Sun**, J. Qi, Y. Xu, "A New Approach to Optimization of Dynamic Reactive Power Sources Addressing FIDVR Issues," IEEE PES General Meeting, July 27-31, 2014, National Harbor, MD.
38. Feifei Bai, Yilu Liu, **Kai Sun**, Navin Bhatt, Xiaoru Wang, "Input Signals Selection for Measurement-Based Power System ARX Dynamic Model Response Estimation," IEEE PES Transmission & Distribution (T&D) Conference and Exposition, April 14-17, 2014, Chicago, IL.
39. Changgang Li, Yong Liu, **Kai Sun**, Yilu Liu, Navin Bhatt, "Measurement Based Power System Dynamics Prediction with Multivariate AutoRegressive Model," IEEE PES Transmission & Distribution (T&D) Conference and Exposition, April 14-17, 2014, Chicago, IL.
40. **K. Sun**, F. Hu, N. Bhatt, "A New Approach for Real-Time Voltage Stability Monitoring Using PMUs," IEEE PES Innovative Smart Grid Technologies Asia (ISGT Asia) Conference, May 20-23, 2014, Kuala Lumpur, Malaysia.
41. G. Wang, C.-C. Liu, N. Bhatt, E. Farantatos, **K. Sun**, "Observability for PMU-based monitoring of nonlinear power system dynamics," 2013 IREP Symposium - Bulk Power System Dynamics and Control – IX, Aug. 25-30, 2013, Rethymnon, Greece.
42. **K. Sun**, X. Luo, J. Wong, "Early Warning of Wide-Area Angular Stability Problems Using Synchrophasors," IEEE PES General Meeting, July 23-26, 2012, San Diego, CA.
43. Y. Liu, **K. Sun**, Y. Liu, "Measurement-based Power System Dynamic Model for Response Estimation," IEEE PES General Meeting, July 23-26, 2012, San Diego, CA.
44. F. Galvan, A. Abur, **K. Sun**, V. Venkatasubramanian, "Implementation of Synchrophasor Monitoring at Entergy: Tools, Training and Tribulations," IEEE PES General Meeting, July 23-26, 2012, San Diego, CA.
45. G. Zhang, **K. Sun**, H. Chen, R. Carroll, Y. Liu, "Application of Synchrophasor Measurements for Improving Operator Situational Awareness," IEEE PES General Meeting, July 24-29, 2011, Detroit, MI.
46. **K. Sun**, P. Zhang, N.S.B.N. Yusuf, "Predicting Post-contingency Stability Margin Using Synchrophasors," IEEE PES General Meeting, July 25-29, 2010, Minneapolis, MN.
47. Y. Hou, C.-C. Liu, P. Zhang, **K. Sun**, "Constructing power system restoration strategies," IEEE International Conference ELECO, November 5-8, 2009, Bursa, Turkey.
48. R. Diao, V. Vittal, **K. Sun**, S. Kolluri, S. Mandal, F. Galvan, "Decision Tree Assisted Controlled Islanding for Preventing Cascading Events," IEEE PES Power Systems Conference & Exposition, March 15-18, 2009, Seattle, WA.
49. N. Bhatt, S. Sarawgi, R. O'Keefe, P. Duggan, M. Koenig, M. Leschuk, S. Lee, **K. Sun**, V. Kolluri, S. Mandal, M. Peterson, D. Brotzman, S. Hedden, E. Litvinov, S. Maslennikov, X. Luo, E. Uzunovic, B. Fardanesh, L. Hopkins, A. Mander, K. Carman, M.Y. Vaiman, M.M. Vaiman, M. Povolotskiy, "Assessing Vulnerability to Cascading Outages," IEEE PES Power Systems Conference & Exposition, March 15-18, 2009, Seattle, WA.

50. Ross Baldick, Badrul Chowdhury, Ian Dobson, Zhaoyang Dong, Bei Gou, David Hawkins, Zhenyu Huang, Manho Joung, Janghoon Kim, Daniel Kirschen, Stephen Lee, Fangxing Li, Juan Li, Zuyi Li, Chen-Ching Liu, Xiaochuan Luo, Lamine Mili, Stephen Miller, Marvin Nakayama, Milorad Papic, Robin Podmore, John Rossmaier, Kevin Schneider, Hongbin Sun, **K. Sun**, David Wang, Zhigang Wu, Liangzhong Yao, Pei Zhang, Wenjie Zhang, Xiaoping Zhang (IEEE PES CAMS Task Force on Understanding, Prediction, Mitigation and Restoration of Cascading Failures), "Vulnerability Assessment for Cascading Failures in Electric Power Systems," IEEE PES Power Systems Conference & Exposition, March 15-18, 2009, Seattle, WA
51. Ross Baldick, Badrul Chowdhury, Ian Dobson, Zhaoyang Dong, Bei Gou, David Hawkins, Henry Huang, Manho Joung, Daniel Kirschen, Fangxing Li, Juan Li, Zuyi Li, Chen-Ching Liu, Lamine Mili, Stephen Miller, Robin Podmore, Kevin Schneider, **K. Sun**, David Wang, Zhigang Wu, Pei Zhang, Wenjie Zhang, Xiaoping Zhang (IEEE PES CAMS Task Force on Understanding, Prediction, Mitigation and Restoration of Cascading Failures), "Initial review of methods for cascading failure analysis in electric power transmission systems," IEEE PES General Meeting, July 20-24, 2008, Pittsburgh, PA.
52. **K. Sun**, S. Lee, "Power System Security Pattern Recognition Based on Phase Space Visualization," IEEE Int. Conf. on Electric Utility Deregulation and Restructuring and Power Technologies (DRPT 2008), April 6-9, 2008, Nanjing, China.
53. **K. Sun**, T. S. Sidhu, M. Jin, "Online Pre-Analysis and Real-Time Matching for Controlled Splitting of Large-Scale Power Networks," IEEE Intl. Conf. Future Power Systems, November 16-18, 2005, Amsterdam, Netherlands.
54. M. Jin, T. S. Sidhu, **K. Sun**, "A System Splitting Scheme Based on the Identification of Controlling Group," IEEE Intl. Conf. Future Power Systems, November 16-18, 2005, Amsterdam, Netherlands.
55. **K. Sun**, Q. Zhao, J. Ma, Q. Lu, "A Two-phase Method Based on OBDD for Searching for Splitting Strategies of Large-scale Power Systems," IEEE PowerCon 2002, October 13-17, 2002, Kunming, China.

Published Technical Reports

1. N. Bhatt, E. Farantatos, A. Del Rosso, **K. Sun**, F. Hu, "Real-Time Reactive Power Management and Voltage Control: Hybrid Voltage Stability Assessment (HVSA)", EPRI Product ID: 3002002868, 2014.
2. **K. Sun**, F. Hu, N. Bhatt, E. Farantatos, A. Del Rosso, "Hybrid Voltage Stability Assessment (HVSA): Integration of Simulation-Based and Measurement-Based Approaches in Real-Time Operation," EPRI Product ID: 3002001313, 2013.
3. W. Kang, **K. Sun**, "Detection of Instability Using Synchrophasors: A Theoretical Investigation on Observability with Synchrophasor Networks," EPRI Product ID: 3002002061, 2013.
4. A. Del Rosso, **K. Sun**, Y. Liu, G. Zhang, H. Chen, "Demonstration of a Novel Synchrophasor-based Situational Awareness System: Wide Area Power System Visualization, On-line Event Replay and Early Warning of Grid Problems", DOE/EPRI Report DOE-DE-OE0000128, March 2012.
5. C. Liu, G. Wang, Y. Liu, **K. Sun**, N. Bhatt, E. Farantatos, "Comprehensive Stability Analysis Using Synchrophasors". EPRI Product ID: 1024264, 2012.
6. E. Farantatos, **K. Sun**, A. Del Rosso (PM), "A Hybrid Framework for Voltage Security Assessment Integrating Simulation- and Measurement-Based Approaches," EPRI Product ID: 1024260, 2012.
7. **K. Sun**, C. Liu, T. Yong, "Visualization of Comprehensive Operating Boundary and Margin Information for Situational Awareness: Methodologies and Functional Requirements," EPRI Product ID: 1021924, 2011.

8. **K. Sun**, Y. Wang, "Program on Technology Innovation: Online Power System Stability Assessment Using Real-time Measurements - Estimating Stability Margin from Measured Dynamic Trajectories," EPRI Product ID: 1022397, 2010.
9. C. Liu, **K. Sun**, "Indication of Potential Cascading Outages Using Measurement Data," EPRI Product ID: 1020051, 2010.
10. **K. Sun**, G. Zhang, "Preventing, Controlling and Mitigating Power System Separation: Developing an Early Warning and Decision Support Tool," EPRI Product ID: 1020057, 2010.
11. C. Liu, Y. Hou, **K. Sun**, S. Liu, "Prototyping a Decision Support Tool for Evaluation of System Restoration Strategy Options," EPRI Product ID: 1017799, 2009.
12. **K. Sun**, K. Hur, "Application of Phasor Measurement Units for Controlled System Separation," EPRI Product ID: 1017800, 2009.
13. **K. Sun**, K. Hur, "Phasor Measurement Unit-Based Out-of-Step Protection Scheme," EPRI Product ID: 1020377, 2009.
14. **K. Sun**, P. Zhang, L. Min, "Measurement-based Voltage Stability Monitoring and Control for Load Centers," EPRI Product ID: 1017798, 2009.
15. **K. Sun**, P. Zhang, "Controlled System Separation," EPRI Product ID: 1015993, 2008.
16. P. Zhang, **K. Sun**, "Effective Use of Distributed Phasor Measurement Units and Disturbance Monitoring Devices for Wide-Area Monitoring, Load Modeling and Voltage Instability Load Shedding," EPRI Product ID: 1018432, 2008.

ADVISED VISITING SCHOLARS

1. Dr. Ping Ma (visiting professor from Qingdao University, China), 11/2012-5/2013
2. Chengxi Liu (visiting PhD student from Aalborg University, Denmark), 10/2012-4/2013
3. Rui Yao (visiting PhD student from Tsinghua University, China), 9/2014-3/2015
4. Donghseng Cai (visiting PhD student from UESTC, China), 9/2014-9/2015
5. Dr. Hualiang Fang (visiting professor from Wuhan University, China), 2/2015-2/2016
6. José Iván Reyes Cabrera (visiting PhD student from CINVESTAV, México), 10/2015-8/2016,
7. Dr. Huimin Gao (visiting professor from Hangzhou Dianzi University, China), 4/2016-10/2016
8. Guoqiang Zu (visiting PhD student from Tianjin University, China), 9/2016 – Present
9. Yichen Guo (visiting PhD student from Shandong University, China), 10/2016 - Present

OTHER ACTIVITIES

Committee members and session chairs

1. Webmaster of IEEE PES Task Force on Oscillation Source Location since 2016
2. Session Chair of the Transactions Paper Session T12 at IEEE PES General Meeting on July 17-21, 2016, Boston, MA.
3. Session Chair of the Paper Forum Session at IEEE PES General Meeting on July 26-30, 2015, Denver, CO.

4. Technical Program Committee member and session chair of IEEE GreenTech Conference, April 15-17, 2015, New Orleans, LA.
5. Panel Chair at the First International Workshop on Power Grid-Friendly Computing (PGFC 2012) in the 3rd IEEE International Green Computing Conference (IGCC'12), June 5, 2012, San Jose, CA.
6. Session Chair of "Cascading Failures" Panel in IEEE PES General Meeting on July 24-29, 2011, Detroit, MI.

Invited presentations

1. Invited presentation titled *Locating the Source of Sustained Oscillation* at **IEEE PES tutorial "Use of Synchrophasors in Grid Operations – From Oscillation Source Detection to Other Use Cases**" in Boston, MA, July 19, 2016.
2. Invited presentation titled *WAMS based Controlled System Separation to Mitigate Cascading Outages* at the **American Control Conference Workshop on Smart Grid Control**, Boston, MA, July 5, 2016,
3. Invited presentation on *Faster-Than-Real-Time Power System Stability Assessment*, at **Tianjin University** on May 29, 2016.
4. Invited presentation titled *Future power grid stability assessment and control* at the **Symposium on Emerging Frontiers in Systems and Control, Tsinghua University**, Beijing, May 27, 2016.
5. Invited presentation on *Measurement-based Power System Stability Assessment*, at **Beijing Jiaotong University** on May 24, 2016
6. Invited presentation titled *Development and Demonstration of CURENT Testbed Systems* at the **2016 *i*-PCGRID (Innovations in Protection & Control for Greater Reliability Infrastructure Development) Workshop**, San Francisco, CA, March 30, 2016.
7. Invited presentation on *Measurement-Based Real-Time Voltage Stability Monitoring for Load Areas* at **NASPI Working Group Meeting** in Atlanta GA on March 24, 2016
8. Invited presentation on *Decision Support Tools for Power System Restoration*, at **Northeast Power Coordinating Council Restoration Working Group Meeting**, Boston, MA, November 3-4, 2015.
9. Invited presentation on *Hybrid Voltage Stability Assessment Using Simulation and Measurement Based Approaches*, **Tsinghua University**, May 13, 2015
10. Invited presentation on *Controlled system separation to mitigate cascading failures using wide-area measurement data*, **Beijing Jiaotong University**, May 7, 2015.
11. Invited presentation on *Decision Trees Based Systematic Approach for Dynamic Security Assessment and Preventive Control in a Power Grid* at **Beijing Jiaotong University**, Beijing, China on June 6, 2014
12. Invited presentation on *Prevention and Mitigation of Cascading Outages: New Challenges and Thinking*, Tsinghua University, Beijing, China, June 3, 2014
13. Invited presentation on *Hybrid voltage stability assessment tool* at **Southwest Power Pool**, Little Rock, AR, June 11, 2013
14. Invited presentation on *Real Time Predictive Capabilities for Power System Stability and Control: A hybrid approach* at **US DOE Advanced Grid Modeling Workshop** in Knoxville, TN on Feb 5, 2013
15. Invited presentation titled *Real-time Wide-area Situational Awareness and Stability Control Using Synchrophasors* at the **NSF US-China Workshop "Identification of Challenges and Opportunities for Large Scale Deployment of the Smart Grid",** Arlington, VA, Feb 28-Mar 1, 2013.

16. Invited presentation on *Demonstration of a Synchrophasor based Wide Area Situational Awareness System* at **NASPI Working Group Meeting** in Atlanta GA on Oct 18, 2012
17. Invited presentation on *Early Warning of Wide-Area Angular Stability Problems Using Synchrophasors* at **the PSDP Power System Early Warning Panel** with 2012 IEEE PES general meeting in San Diego, CA on July 24, 2012

SOFTWARE PRUDUCTS (as one of the key developers)

1. Online Measurement-Based Voltage Stability Assessment Tool (MBVSA) Version 1.0 Beta, EPRI Product ID: 1024989, 2012
2. Synchrophasor-based Wide-Area Situation Awareness Tool (WASAT) Version 1.0 Beta, EPRI Product ID: 1023123, 2012
3. System Separation Decision Support (SSDS) Tool Version 1.0, EPRI Product ID: 1021714, 2011
4. Measurement-Based Voltage Stability Analysis (MVSA) Tool Version 1.0, EPRI Product ID: 1020053, 2010
5. Measurement-based Voltage Stability Margin Calculator (MVSMC) Version 1.0, EPRI Product ID: 1020264, 2009