

Andy Sun
Iberdrola-Avangrid Professor in Electric Power Systems
Associate Professor in Operations Research
Sloan School of Management
Massachusetts Institute of Technology

I. EARNED DEGREES

- Massachusetts Institute of Technology. Cambridge, MA
 - Ph.D. in Operations Research. 2011
 - Dissertation: Advances in Electric Power Systems: Robustness Adaptability, and Fairness
- Massachusetts Institute of Technology. Cambridge, MA
 - M.S. in Media Arts and Sciences. Media Laboratory. 2005
- Tsinghua University. Beijing, China
 - B.E. in Electronic Engineering, July 2003

II. EMPLOYMENT HISTORY

- Iberdrola-Avangrid Professor in Electric Power Systems, MIT, Cambridge, MA, Jan. 2022 – Present
- Associate Professor (tenured) in Operations Research, Sloan School of Management, MIT, Cambridge, MA, Jan. 2022 – Present
- McKenney Family Associate Professor. Georgia Institute of Technology. H. Milton Stewart School of Industrial and Systems Engineering. Atlanta, GA. Apr. 2021 – Dec. 2021
- Associate Professor (tenured). Georgia Institute of Technology. H. Milton Stewart School of Industrial and Systems Engineering (ISyE), Atlanta, GA, Aug. 2018 – Dec. 2021
- Anderson-Interface Early Career Professor. Georgia Institute of Technology. H. Milton Stewart School of Industrial and Systems Engineering. Atlanta, GA. Jun. 2018 – Mar. 2021
- Assistant Professor. Georgia Institute of Technology. H. Milton Stewart School of Industrial and Systems Engineering, Atlanta, GA. Aug. 2012 – Aug. 2018
- Postdoctoral Associate. IBM T.J. Watson Research Center. Yorktown Heights, NY. Aug. 2011 – Aug. 2012
- Research Internship. ISO New England, Inc. Holyoke, MA. June 2010 – Aug. 2010
- Visiting Researcher. ISO New England, Inc. Holyoke, MA. June 2009 – Aug. 2009
- Analytics Operations Engineering, Boston, MA. June 2007 – Aug. 2007

III. HONORS AND AWARDS

A. INTERNATIONAL OR NATIONAL AWARD

A1. Award won by Dr. Sun

- **ARPA-E Grid Optimization Competition, Sixed Place, 2021.**
- **ARPA-E Grid Optimization Competition, Third Place, 2020.**
- **Best Paper Published in IEEE Trans. on Power Systems 2017 – 2019.**

- **INFORMS ENRE Best Paper in Energy, First Place, 2019.**
- **National Science Foundation (NSF), CAREER Award, 2018.**
- **51st Hawaii International Conference on System Sciences (HICSS) 2018, Best Paper Award**, for the paper titled “An Adaptive Optimization Based Load Shedding Scheme in Microgrids,” with Ph.D. student Amin Gholami
- **INFORMS ENRE Best Paper in Energy, First Place, 2017**, for the paper titled “Multistage Adaptive Robust Optimization for the Unit Commitment Problem,” with Ph.D. student Alvaro Lorca
- **IEEE Senior Member, 2016**
- **INFORMS ENRE Energy Best Paper Award, second place, 2015**, for the paper entitled “Adaptive robust optimization for the security-constrained unit commitment problem”
- **INFORMS Junior Faculty Interest Group Paper Competition, third place, 2014**, for the paper entitled “Multistage robust optimization for Electric Power Systems Operation” with Ph.D. student Alvaro Lorca
- **INFORMS George B. Dantzig Dissertation Award, second place, 2011**

A2. Award won by students supervised by Dr. Sun

- **Best Graduate Paper Prize, Third Place, North America Power Symposium, 2022**, for the paper entitled “Impacts of Dynamic Line Ratings on the ERCOT Transmission System” co-authored with doctoral student **Thomas Lee**
- **INFORMS Optimization Society Best Student Paper Award, Honorable Mention, 2021**, for the paper entitled “Stochastic Dual Dynamic Programming for Multistage Stochastic Mixed-Integer Nonlinear Optimization” for doctoral student **Shixuan Zhang**
- **INFORMS George Dantzig Dissertation Award, Finalist, 2017**, for doctoral student **Alvaro Lorca**
- **INFORMS ENRE Student Paper Award, Finalist, 2016**, for the paper entitled “Adaptive robust multi-period AC optimal power flow”, doctoral student **Alvaro Lorca**
- **INFORMS Data Mining Society Student Best Paper Award, Finalist, 2015**, for the paper entitled “Sensor-driven condition-based generator maintenance scheduling”, doctoral student **Murat Yildirim**
- **INFORMS Undergraduate Operations Research Prize, Winner, 2014**, for the paper entitled “Robust demand response portfolio management under operational uncertainty” by H. Chen, S. Deng, A. Sun, undergraduate student **Hongfan Chen**

IV. RESEARCH, SCHOLARSHIP, AND CREATIVE ACTIVITIES

A. PUBLISHED BOOKS, BOOK CHAPTERS, AND EDITED VOLUMES

(Students supervised by Dr. Sun are in bold.)

A1. Books

1. X. A. Sun and A. Conejo. Robust Optimization with Applications in Energy Systems, Springer, Springer, 2022.

A2. Refereed Book Chapters

1. X. A. Sun. Robust optimization in electric power systems. Invited and refereed chapter in *Advances and Trends in Optimization with Engineering Applications*, edited by T. Terlaky, M. Anjos, and S. Ahmed, SIAM, 2017.
2. X. A. Sun and A. Lorca. Advances of robust optimization in electric power system operations. Invited and refereed chapter in *Integration of Large Scale Renewable Energy into Bulk Power System: From Planning to Operation*. Springer Science, edited by P. Du, R. Baldick, A. Tuohy, Springer, 2017.
3. X. A. Sun and D. Phan. Modern optimization methods and techniques for electric power system operation. Invited and refereed chapter. *Encyclopedia of Operations Research and Management Science*, 2014.

B. REFEREED PUBLICATIONS AND SUBMITTED ARTICLES

B1. Published and Submitted Journal Articles

1. **Shixuan Zhang** and X. A. Sun. Stochastic Dual Dynamic Programming for Multistage Stochastic Mixed-Integer Nonlinear Optimization, *Mathematical Programming*, 196: 935-985, 2022.
2. **Kaizhao Sun** and X. A. Sun. Algorithms for Difference-of-Convex (DC) Programs based on Difference-of-Moreau-Envelopes Smoothing, *INFORMS Journal on Optimization*, accepted for publication, 2022.
3. **Kaizhao Sun** and X. A. Sun. A Two-level Distributed Algorithm for General Nonconvex Constrained Optimization, *Computational Optimization and Applications*, accepted for publication, 2022.
4. **Shixuan Zhang** and X. A. Sun. On Distributionally Robust Multistage Convex Optimization: New Algorithms and Complexity Analysis, submitted to *Mathematics of Operations Research*, 2022.
5. **A. Gholami** and X. A. Sun. Stability of Multi-Microgrids: New Certificates, Distributed Control, and Braess's Paradox, *IEEE Transactions on Control of Network Systems*, 9(1): 308-319, 2022.
6. **A. Gholami** and X. A. Sun. The Role of Damping in Second-Order Dynamical Systems with Applications to Power Grid Stability, *SIAM Journal on Applied Dynamical Systems*, 21(1): 405-437, 2022.
7. **Amin Gholami***, **Kaizhao Sun***, **Shixuan Zhang***, X. A. Sun. Solving Large-Scale Security Constrained AC Optimal Power Flow Problems, submitted to *Operations Research*, 2021. (* alphabetical order)
8. **Kaizhao Sun** and X. A. Sun. A Two-Level ADMM Algorithm for AC Optimal Power Flow with Convergence Guarantees, *IEEE Transactions on Power Systems*, 36(6): 5271-5281, 2021.
9. **Bai Cui** and X. A. Sun. Securing Voltage Stability in Power Grids via Holomorphic Dynamics, submitted to *SIAM Journal on Control and Optimization*, 2021.

10. H. Khazaei, Y. Zhao, X. A. Sun. On the Equilibria and Efficiency of Electricity Markets with Renewable Power Producers and Congestion Constraints, submitted to the *IEEE Transactions on Smart Grid*, 2020.
11. A. Bosisio, A. Berizzi, E. Amaldi, C. Bovo, Andy Sun. Optimal Feeder Routing in Urban Distribution Networks Planning with Layout Constraints and Losses. Accepted for publication in *Journal of Modern Power Systems and Clean Energy*, 2020.
12. **M. Yildirim**, Nagi Gabraeel, and Andy Sun. Leveraging Predictive Analytics to Control and Coordinate Operations, asset loading, and maintenance, *IEEE Transactions on Power Systems*, Vol. 34, No. 6, 4279-4290, 2019.
13. **A. Gholami** and X. A. Sun. Towards Resilient Operation of Multi-microgrids: an MISOCP-based Frequency-constrained Approach. *IEEE Transactions on Control of Network Systems*, Vol. 6, No. 3, 925-936, 2019.
14. **J. Zou**, S. Ahmed, and X. A. Sun. Multistage Stochastic Unit Commitment Using Stochastic Dual Dynamic Integer Programming. *IEEE Transactions on Power Systems*, Vol. 34, No. 3, 1814-1823, 2019.
15. **J. Zou**, S. Ahmed, and X. A. Sun. Stochastic Dual Dynamic Integer Programming. *Mathematical Programming*, Vol. 175, No. 1, 461-502, 2019.
16. **B. Kocuk**, S. Dey, and X. A. Sun. Matrix Minor Reformulation and SOCP-based Spatial Branch-and-cut Method for the AC Optimal Power Flow Problem. *Mathematical Programming Computation*, Vol. 10, No. 4, 557-596, 2018.
17. **C. Bai** and X. A. Sun. A New Voltage Stability-Constrained Optimal Power Flow Model: Sufficient Condition, SOCP Representation, and Relaxation. *IEEE Transactions on Power Systems*, Vol. 33, No. 5, 5092-5102, 2018.
18. **A. Lorca** and X. A. Sun. Adaptive Robust Multi-period AC Optimal Power Flow. *IEEE Transactions on Power Systems*, Vol. 33, No. 2, 1993-2003, 2018.
19. **J. Zou**, S. Ahmed, and X. A. Sun. Partially Adaptive Stochastic Optimization for Generation Capacity Expansion Problem. *INFORMS Journal on Computing*, Vol 30, No. 2, 388-401, 2018.
20. **J. Feizollahi**, S. Ahmed, and X. A. Sun. Exact Augmented Lagrangian Duality for Mixed Integer Linear Programming. *Mathematical Programming*, 161(1): 365-387, 2017.
21. **A. Lorca** and X. A. Sun. Multistage Robust Unit Commitment With Dynamic Uncertainty Sets and Storage Devices. *IEEE Transactions on Power Systems*, 32(3): 1678-1688, 2017.
22. **M. Yildirim**, N. Gebraeel, and X. A. Sun. Integrated Predictive Analytics and Optimization for Wind Farm Maintenance and Operations. Accepted for publication in *IEEE Transactions on Power Systems*, 2017.
23. **B. Kocuk**, S. Dey, and X. A. Sun. New Formulation and Strong MISOCP Relaxation for AC Optimal Transmission Switching Problem. *IEEE Transactions on Power Systems*, 32(6): 4161-4170, 2017.

24. **B. Kocuk**, S. Dey, and X. A. Sun. Strong SOCP Relaxations for the Optimal Power Flow Problem. *Operations Research*, 64(6): 1177-1196, 2016.
25. **B. Kocuk**, H. Jeon, S. Dey, J. Linderoth, J. Luedtke, and X. A. Sun. A Cycle-based Formulation and Valid Inequalities for Dc Power Transmission Problems with Switching. *Operations Research*, 64(4): 922-938, 2016.
26. **Lorca**, X. A. Sun, E. Litvinov, and T. Zheng. Multistage Robust Unit Commitment With Affine Policy and Improved Constraint Generation. *Operations Research*, 64(1): 32-51, 2016.
27. **M. Yildirim**, X. A. Sun, N. Gebraeel. Sensor-driven Condition Based Generator Maintenance Scheduling, Part II: Incorporating Operations. *IEEE Transactions on Power Systems*, 31(6): 4263-4271, 2016.
28. **M. Yildirim**, X. A. Sun, N. Gebraeel. Sensor-driven Condition Based Generator Maintenance Scheduling, Part I: Maintenance Problem. *IEEE Transactions on Power Systems*, 31(6): 4253-4262, 2016.
29. **B. Kocuk**, S. Dey, and X. A. Sun. Inexactness of SDP Relaxation for Optimal Power Flow Over Radial Networks and Valid Inequalities for Global Optimization. *IEEE Transactions on Power Systems*, 31(1): 642-651, 2016.
30. **A. Lorca** and X. A. Sun. Adaptive Robust Optimization with Dynamic Uncertainty Sets for Multi-period Economic Dispatch under Significant Wind. *IEEE Transactions on Power Systems*, 30(4): 1702-1713, 2015.
30. A. Becker and X. A. Sun. An Analytical Approach for Fantasy Football Draft and Lineup Management. *Journal for Quantitative Analysis in Sports*, 12(1): 17-30, 2016.
31. D. Phan and X. A. Sun. Minimal Impact Corrective Actions in Security-Constrained Optimal Power Flow via Sparsity Regularization. *IEEE Transactions on Power Systems*, 30(4): 1947-1956, 2015.
32. D. Bertsimas, E. Litvinov, X. A. Sun, J. Zhao, and T. Zheng. Adaptive Robust Optimization for the Security Constrained Unit Commitment Problem. *IEEE Transactions on Power Systems*, 28(1): 52 – 63, 2013.
33. D. Bertsimas, R. M. Freund, and X. A. Sun. An Accelerated First-order Method for Solving Unconstrained SoS Polynomial Optimization Problems. *Optimization Methods and Software*, 28(3): 424 – 441, June 2013.
34. D. Bertsimas, V. Goyal, and X. A. Sun. A Geometric Characterization of the Power of Finite Adaptability in Multi-stage Stochastic and Adaptive Optimization. *Mathematics of Operations Research*, 36(1): 24 – 54, 2011.

B2. Conference Presentation with Proceedings (Refereed)

1. **T. Lee**, V. Nair, and X. A. Sun. Impacts of Dynamic Line Ratings on the ERCOT Transmission System. Proceedings of the North America Power Symposium, 2022.
2. **A. Gholami** and X. A. Sun. A Distributed Scheme for Stability Assessment in Large Scale Structure-Preserving Models via Singular Perturbation. Accepted at *54th Hawaii International Conference on Systems Sciences (HICSS)*, 2021.
3. **A. Gholami** and X. A. Sun. A Fast Certificate for Power System Stability. Accepted at *IEEE Conference on Decision and Control (CDC)*, 2020.

4. **A. Gholami**, T. Shekari, X. A. Sun. An Adaptive Optimization Based Load Shedding Scheme in Microgrids. *51st Hawaii International Conference on System Sciences (HICSS)*, Jan. 2018.
5. P. Panciatici, M. C. Campi, S. Garatti, S. H. Low, D. Molzahn, X. A. Sun, and L. Wehenkel. Advanced optimization methods for power systems. Invited paper at the *18th Power Systems Computation Conference (PSCC)* in Wroclaw, Poland, 2014.
6. X. A. Sun and **A. Lorca**. Adaptive robust optimization for daily power system operations. Invited paper at the *18th Power Systems Computation Conference (PSCC)* in Wroclaw, Poland, 2014.
7. X. A. Sun and **A. Lorca**. Adaptive robust optimization and dynamic uncertainty sets for multi-period economic dispatch under significant wind. Accepted at *Proceedings of INFORMS Manufacturing & Service Operations Management (MSOM)*, 2014.
8. A. Thattle, X. A. Sun, and L. Xie. Robust optimization based economic dispatch for managing system ramp capability. Accepted at *47th Annual Hawaii International Conference on System Sciences (HICSS)*, 2344 – 2352, Jan. 2014.
9. X. A. Sun, Robust optimization for energy systems scheduling. Invited paper at the *IEEE Symposium on Information Processing in the Smart Grid*, 2013.
9. X. A. Sun and B. Zhang. Robust optimal stopping. Accepted at *Proceedings of INFORMS Manufacturing & Service Operations Management (MSOM)*, 2013.
10. X. A. Sun, S. Ghosh, and D. Phan. Fully decentralized optimal power flow algorithms. Accepted at *IEEE Power & Energy Society General Meeting*, 2013.
11. J. Wang, W. Liu, X. A. Sun, Y. Jiang. Learning to hash with listwise supervision. Accepted at the *Computer Vision and Pattern Recognition*, 2013.
12. D. Bertsimas and X. A. Sun. A Fairness-based proposal for electricity market design. *Proceedings of INFORMS Manufacturing & Service Operations Management (MSOM)*, 2012.
13. S. Ghosh, X. A. Sun, and X. Zhang. Customer profiling for demand response programs in smart grids. *IEEE PES Innovative Smart Grid Technologies – Asia (ISGT Asia)*, 2012.
14. A. Becker and X. A. Sun. An analytical approach for fantasy football draft and lineup management. Abstract accepted at *MIT Sloan Sports Analytics Conference*, 2011.