Andy Sun

Iberdrola-Avangrid Associate Professor
Operations Research and Statistics
Sloan School of Management
Massachusetts Institute of Technology

I. EARNED DEGREES

- Massachusetts Institute of Technology. Cambridge, MA
  - Ph.D. in Operations Research. 2011
    - Dissertation title: Advances in Electric Power Systems: Robustness Adaptability, and Fairness
    - Adviser: Professor Dimitris Bertsimas
- 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

- Associate Professor (tenured) in Operations Research and Statistics, Sloan School of Management, MIT, Cambridge, MA, Jan. 2022 – Present
- Iberdrola-Avangrid Associate Professor in Electric Power Systems, 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

- Best Paper Published in Computational Optimization and Applications, Ranked No. 2 out of 99 papers published in the journal in 2023.

- ARPA-E Grid Optimization Competition Challenge 3, Second Place, 2023.
- ARPA-E Grid Optimization Competition Challenge 2, Top 10, 2021.
- ARPA-E Grid Optimization Competition Challenge 1, 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

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

B. INSTITUTE OR SCHOOL AWARD

- **Thanks a Teacher Notes:** Fall 2012 (ISyE 4133), Spring 2017 (Master student supervisee Johannes Milz), from Center for Teaching and Learning, Georgia Tech, ISyE 6669 (Fall 2018, Fall 2019, Fall 2020), ISyE 6673 (Spring 2020)

IV. RESEARCH, SCHOLARSHIP, AND CREATIVE ACTIVITIES

A. PUBLISHED BOOKS, BOOK CHAPTERS, AND EDITED VOLUMES

(Students or postdoc supervised by Dr. Sun are underscored.)

A1. Books

1. Robust Optimization with Applications in Energy Systems. Andy Sun and Antonio Conejo. Springer, Springer, 2022.

A2. Refereed Book Chapters

1. Stochastic Dual Dynamic Integer Programming (SDDiP). Christian Fullner, Shixuan Zhang, Andy Sun, and Steffen Rebennack. ***Encyclopedia of Optimization***, Third Edition, edited by Panos Pardalos and Oleg Prokopyev, 2022.
2. Robust optimization in electric power systems. Andy Sun. Invited and refereed chapter in ***Advances and Trends in Optimization with Engineering Applications***, edited by T. Terlaky, M. Anjos, and S. Ahmed, SIAM, 2017.
3. Advances of robust optimization in electric power system operations. Andy Sun and Alvaro Lorca. 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.
4. Modern optimization methods and techniques for electric power system operation. Andy Sun and Dzung Phan. Invited and refereed chapter. ***Encyclopedia of Operations Research and Management Science***, 2014.

B. REFEREED PUBLICATIONS AND SUBMITTED ARITICLES

B1. Published Journal Articles

1. Resilience of renewable power systems under climate risks. Luo Xu, Kairui Feng, Ning Lin, ATD Perera, H Vincent Poor, Le Xie, Chuanyi Ji, X Andy Sun, Qinglai Guo, Mark O'Malley. ***Nature Reviews Electrical Engineering.*** Vol 1, 53-66, 2024.
2. Carbon-aware optimal power flow. Xin Chen, Andy Sun, Wenbo Shi, Na Li. ***IEEE Transactions on Power Systems***, Early Access, 1-14, December 2024.
3. Solvability of power flow equations through existence and uniqueness of complex fixed point. Bai Cui, Andy Sun. ***Automatica***, accepted for publication in 2024.
4. Nonlinear conjugate gradient methods: worst-case convergence rates via computer-assisted analyses. Shuvo Das Gupta, Robert M. Freund, Andy Sun, and Adrien Taylor. ***Mathematical Programming***, August 2024.
5. Dual Descent ALM and ADMM. Kaizhao Sun, Andy Sun. ***SIAM Journal on Optimization***, Vol 34, Iss 2, 1679-1707, 2023.

6. Robust Optimization with Continuous Decision-Dependent Uncertainty with Applications in Demand Response Portfolio Management. Hongfan Chen, Andy Sun, Haoxiang Yang. ***SIAM Journal on Optimization***, Vol 33, Iss 3, 2406-2434, 2023.
7. An ADMM-Based Distributed Optimization Method for Solving Security-Constrained Alternating Current Optimal Power Flow. Amin Gholami*, Kaizhao Sun*, Shixuan Zhang*, Andy Sun. ***Operations Research***, 71(6):2045-2060, 2023. (* alphabetic order)
8. Recent Developments in Security-Constrained AC Optimal Power Flow: Overview of Challenge 1 in the ARPA-E Grid Optimization Competition. Ignacio Aravena, …, Shixuan Zhang, …, Amin Gholami, Kaizhao Sun, Andy Sun, …. ***Operations Research***, 71(6):1997-2014, 2023.
9. A Two-level Distributed Algorithm for General Nonconvex Constrained Optimization. Kaizhao Sun and Andy Sun. ***Computational Optimization and Applications,*** vol. 84, 609-649, 2023.
10. Stochastic Dual Dynamic Programming for Multistage Stochastic Mixed-Integer Nonlinear Optimization. Shixuan Zhang and Andy Sun. ***Mathematical Programming***, 196, 935-985, 2022.
11. Algorithms for Difference-of-Convex (DC) Programs based on Difference-of-Moreau-Envelopes Smoothing. Kaizhao Sun and Andy Sun. ***INFORMS Journal on Optimization***, 5(4):321-339, 2022.
12. Stability of Multi-Microgrids: New Certificates, Distributed Control, and Braess's Paradox. Amin Gholami and Andy Sun. ***IEEE Transactions on Control of Network Systems***, 9(1): 308-319, 2022.
13. The Impact of Damping in Second-Order Dynamical Systems with Applications to Power Grid Stability. Amin Gholami and Andy Sun. ***SIAM Journal on Applied Dynamical Systems***, 21(1): 405-437, 2022.
14. A Two-Level ADMM Algorithm for AC Optimal Power Flow with Convergence Guarantees. Kaizhao Sun and Andy Sun. ***IEEE Transactions on Power Systems***, 36(6):5271-5281, 2021.
15. Optimal Feeder Routing in Urban Distribution Networks Planning with Layout Constraints and Losses. Alessandro Bosisio, Alberto Berizzi, Edoardo Amaldi, Crisitian Bovo, and Andy Sun. ***Journal of Modern Power Systems and Clean Energy***, 8(5): 1005-1014, 2020.
16. Leveraging Predictive Analytics to Control and Coordinate Operations, asset loading, and maintenance. Murat Yildirim, Nagi Gabraeel, and Andy Sun. ***IEEE Transactions on Power Systems***, 34(6): 4279-4290, 2019.
17. Towards Resilient Operation of Multi-microgrids: an MISOCP-based Frequency-constrained Approach. Amin Gholami and Andy Sun. ***IEEE Transactions on Control of Network Systems***, 6(3): 925-936, 2019.
18. Multistage Stochastic Unit Commitment Using Stochastic Dual Dynamic Integer Programming. Jikai Zou, Shabbir Ahmed, and Andy Sun. ***IEEE Transactions on Power Systems***, 34(3): 1814-1823, 2019.

19. Stochastic Dual Dynamic Integer Programming. Jikai Zou**,** Shabbir Ahmed, and Andy Sun. ***Mathematical Programming***, 175(1): 461-502, 2019.
20. Matrix Minor Reformulation and SOCP-based Spatial Branch-and-cut Method for the AC Optimal Power Flow Problem. Burak Kocuk, Santanu Dey, and Andy Sun. ***Mathematical Programming Computation***, 10(4): 557-596, 2018.
21. A New Voltage Stability-Constrained Optimal Power Flow Model: Sufficient Condition, SOCP Representation, and Relaxation. Cui Bai and Andy Sun. ***IEEE Transactions on Power Systems***, 33(5): 5092-5102, 2018.
22. Adaptive Robust Multi-period AC Optimal Power Flow. Alvaro Lorca and Andy Sun. ***IEEE Transactions on Power Systems***, 33(2): 1993-2003, 2018.
23. Partially Adaptive Stochastic Optimization for Generation Capacity Expansion Problem. Jikai Zou, Shabbir Ahmed, and Andy Sun. ***INFORMS Journal on Computing***, 30(2): 388-401, 2018.
24. Exact Augmented Lagrangian Duality for Mixed Integer Linear Programming. Javad Feizollahi, Shabbir Ahmed, and Andy Sun. ***Mathematical Programming***, 161(1): 365-387, 2017.
25. Multistage Robust Unit Commitment with Dynamic Uncertainty Sets and Storage Devices. Alvaro Lorca and Andy Sun. ***IEEE Transactions on Power Systems***, 32(3): 1678-1688, 2017.
26. Integrated Predictive Analytics and Optimization for Opportunistic Maintenance and Operations in Wind Farms. Murat Yildirim, Nagi Gebraeel, and Andy Sun. ***IEEE Transactions on Power Systems***, Vol. 32, No. 6, 4319-4328, 2017.
27. New Formulation and Strong MISOCP Relaxation for AC Optimal Transmission Switching Problem. Burak Kocuk, Santanu. Dey, and Andy Sun. ***IEEE Transactions on Power Systems***, 32(6): 4161-4170, 2017.
28. Strong SOCP Relaxations for the Optimal Power Flow Problem. Burak Kocuk, Santanu. Dey, and Andy Sun. ***Operations Research***, 64(6): 1177-1196, 2016.
29. A Cycle-based Formulation and Valid Inequalities for Dc Power Transmission Problems with Switching. Burak Kocuk, Hyemin Jeon, Santanu Dey, Jeff Linderoth, Jim Luedtke, and Andy Sun. ***Operations Research,*** 64(4): 922-938, 2016.
30. Multistage Robust Unit Commitment with Affine Policy and Improved Constraint Generation. Alvaro Lorca, Andy Sun, Eugene Litvinov, and Tongxin Zheng. ***Operations Research,*** 64(1): 32-51, 2016.
31. Sensor-driven Condition Based Generator Maintenance Scheduling, Part II: Incorporating Operations. Murat Yildirim, Andy Sun, Nagi Gebraeel. ***IEEE Transactions on Power Systems,*** 31(6): 4263-4271, 2016.
32. Sensor-driven Condition Based Generator Maintenance Scheduling, Part I: Maintenance Problem. Murat Yildirim, Andy Sun, Nagi Gebraeel. ***IEEE Transactions on Power Systems,*** 31(6): 4253-4262, 2016.
33. Inexactness of SDP Relaxation for Optimal Power Flow Over Radial Networks and Valid Inequalities for Global Optimization. Burak Kocuk, Santanu Dey, and Andy Sun. ***IEEE Transactions on Power Systems,*** 31(1): 642-651, 2016.

34. Adaptive Robust Optimization with Dynamic Uncertainty Sets for Multi-period Economic Dispatch under Significant Wind. Alvaro Lorca and Andy Sun. ***IEEE Transactions on Power Systems***, 30(4): 1702-1713, 2015.
30. An Analytical Approach for Fantasy Football Draft and Lineup Management. Adrian Becker and Andy Sun. ***Journal for Quantitative Analysis in Sports,*** 12(1): 17-30, 2016.
31. Minimal Impact Corrective Actions in Security-Constrained Optimal Power Flow via Sparsity Regularization. Dzung Phan and Andy Sun. ***IEEE Transactions on Power Systems,*** 30(4): 1947-1956, 2015.
32. Adaptive Robust Optimization for the Security Constrained Unit Commitment Problem. Dimitris Bertsimas, Eugene Litvinov, Andy Sun, Jinye Zhao, and Tongxin Zheng. ***IEEE Transactions on Power Systems***, 28(1): 52 - 63, 2013.
33. An Accelerated First-order Method for Solving Unconstrained SoS Polynomial Optimization Problems. Dimitris Bertsimas, Robert. M. Freund, and Andy Sun. ***Optimization Methods and Software***, 28(3): 424-441, 2013.
34. A Geometric Characterization of the Power of Finite Adaptability in Multi-stage Stochastic and Adaptive Optimization. Dimitris Bertsimas, Vineet Goyal, and Andy Sun. ***Mathematics of Operations Research***, 36(1): 24-54, 2011.

B2. Submitted and Working Journal Articles

35. The Proximal Bundle Algorithm Under a Frank-Wolfe Perspective: an Improved Complexity Analysis. David Fersztand and Andy Sun. Submitted to ***SIAM Journal on Optimization***, 2024.
36. BattOpt: Optimal Facility Planning for Electric Vehicle Battery Recycling. Matthew Brun and Andy Sun. Submitted to ***Operations Research***, 2024.
37. On Distributionally Robust Multistage Convex Optimization: New Algorithms and Complexity Analysis. Shixuan Zhang and Andy Sun. Submitted to ***Mathematical Programming***, 2024.
38. On Distributionally Robust Multistage Convex Optimization: Data-Driven Models and Performance. Shixuan Zhang and Andy Sun. Submitted to ***INFORMS Journal on Optimization***, 2024.
39. A new framework to generate Lagrangian cuts in multistage stochastic mixed-integer programming. C Füllner, XA Sun, S Rebennack. Submitted to ***SIAM Journal on Optimization***, 2024.
40. On Lipschitz regularization and Lagrangian cuts in multistage stochastic mixed-integer linear programming. C. Füllner, X. A. Sun, S. Rebennack. To be submitted to ***Mathematical Programming***, 2024.
41. Solar radiation anomaly events modeling using spatio-temporal mutually interactive processes. Minghe Zhang, Chen Xu, Andy Sun, Feng Qiu, Yao Xie. Submitted to ***INFORMS Journal on Data Science***, 2023.

B3. Conference Presentation with Proceedings (Refereed)

1. Impacts of Dynamic Line Ratings on the ERCOT Transmission System. Thomas Lee, Vineet Nair, and Andy Sun. ***Proceedings of the North America Power Symposium***, 2022.
2. A Distributed Scheme for Stability Assessment in Large Scale Structure-Preserving Models via Singular Perturbation. Amin Gholami and Andy Sun. ***54th Hawaii International Conference on Systems Sciences*** *(HICSS)*, 2021.
3. A Fast Certificate for Power System Stability. Amin Gholami and Andy Sun. ***IEEE Conference on Decision and Control*** *(CDC)*, 2020.
4. An Adaptive Optimization Based Load Shedding Scheme in Microgrids. Amin Gholami, T. Shekari, Andy Sun. ***51st Hawaii International Conference on System Sciences*** *(HICSS)*, Jan. 2018.
5. Advanced optimization methods for power systems. Patric Panciatici, Marco C. Campi, Simone Garatti, Steven Low, Daniel Molzahn, Andy Sun, and Luis Wehenkel. Invited paper at the ***18th Power Systems Computation Conference*** *(PSCC)* in Wroclaw, Poland, 2014.
6. Adaptive robust optimization for daily power system operations. Andy Sun and Alvaro Lorca. Invited paper at the ***18th Power Systems Computation Conference*** *(PSCC)* in Wroclaw, Poland, 2014.
7. Adaptive robust optimization and dynamic uncertainty sets for multi-period economic dispatch under significant wind. Andy Sun and Alvaro Lorca. ***Proceedings of INFORMS Manufacturing & Service Operations Management*** *(MSOM)*, 2014.
8. Robust optimization based economic dispatch for managing system ramp capability. Anupam Thattle, Andy Sun, and Le Xie. ***47th Annual Hawaii International Conference on System Sciences*** (*HICSS), 2344-2352,* 2014.
9. Robust optimization for energy systems scheduling. Andy Sun, Invited paper at the ***IEEE Symposium on Information Processing in the Smart Grid****,* 2013.
10. Robust optimal stopping. Andy Sun and Bo Zhang. ***Proceedings of INFORMS Manufacturing & Service Operations Management*** *(MSOM),* 2013.
11. Fully decentralized optimal power flow algorithms. Andy Sun, Soumyadip Ghosh, and Dzung Phan. ***IEEE Power & Energy Society General Meeting***, 2013.
12. Learning to hash with listwise supervision. Jun Wang, Wei Liu, Andy Sun, Yu-Gang Jiang. ***Computer Vision and Pattern Recognition****,* 2013.
13. A Fairness-based proposal for electricity market design. Dimitris Bertsimas and Andy Sun. ***Proceedings of INFORMS Manufacturing & Service Operations Management*** *(MSOM)*, 2012.
14. Customer profiling for demand response programs in smart grids. Soumyadip Ghosh, Andy Sun, and Xiaoxuan Zhang. ***IEEE PES Innovative Smart Grid Technologies – Asia*** *(ISGT Asia),* 2012.

C. OTHER PUBLICATIONS AND CREATIVE PRODUCTS

C1. Patents

C.1.a. Patents Awarded

1. Reducing corrective actions in security-constrained optimal power flow via sparsity regularization, US Patent 20150378384 A1, with D. Phan, Dec. 31, 2015.
2. Distributed control of electric power grids, US Patent 20150377936, with D. Phan and S. Ghosh, Dec. 31, 2015.
3. Ranking supervised hashing, US Patent 9020954 B2, with J. Wang, April 28, 2015.

C.1.b. Invention Disclosure

1. Target-setting for asset performance against benchmark, (IBM Invention Disclosure No. YOR820131619, with R. Lederman and C. Dorai), filed in Nov. 2015.

D. PRESENTATIONS

D1. Invited Conference and Workshop Presentations

1. *Adaptive Optimization and Learning for Daily Operation of Clean Power Systems,* MIT Future Energy Systems Center, Spring Workshop, Jan 25, 2024.
2. *Optimization for the joint resiliency of power grid and electric transportation,* MIT Future Energy Systems Center, Spring Workshop, Feb 29, 2024.
3. *New Algorithms for Solving Large-Scale Power Grid Optimization Problems,* 58th Annual Conference on Information Sciences & Systems, Princeton University, March 13, 2024.
4. *How Can Operations Research Be Critical for Green Energy Transition?* The Architecture of Green Energy Systems Workshop, Institute of Mathematics and Statistical Innovation, University of Chicago, June 21, 2024.
5. *Recent Advances in Solving Security Constrained Unit Commitment and AC Optimal Power Flow.* Software Conference, Federal Energy Regulatory Commission, July 9, 2024.
6. *Recent Advances in Solving Security Constrained UC ACOPF.* International Symposium of Mathematical Programming. Montreal, Canada. July 23, 2024.
7. *AC Power Flow with Dynamic Line Rating.* The First MIT-KENTECH Workshop on Power System Modeling and Optimization. Organizer. MIT. October 24, 2024.
8. *Challenges for Electric Power Grid's Green Transition.* Harvard Climate Symposium. November 2, 2024.
9. *GO Challenge 3 Continuation & Beyond.* ARPA-E Grid Optimization Competition Kick-Off Meeting. November 7, 2024.
10. *Advances in Solving Grid Optimization Problems.* INFORMS Annual Meeting, Phoenix, Oct. 2023.
11. *Summary of Experiences in Participating ARPA-E GO Competition.* INFORMS Annual Meeting, Phoenix, Oct. 2023.
12. *TIM-GO Experience in ARPA-E GO Challenge 3.* ARPA-E Software Annual Meeting, Sept 2023.
13. *On Multistage Distributionally Robust Optimization: New Algorithms and Complexity Analysis.* International Conference on Stochastic Programming (ICSP), Davis, July 2023.

14. *On Multistage Distributionally Robust Optimization: New Algorithms, Complexity Analysis, and Computation.* SIAM Conference on Optimization. Seattle, May 2023.
15. *OR and Analytics in Electric Energy System Transition.* MIT Future of OR and Analytics Workshop. Cambridge, MA, Oct. 2022.
16. *Ensuring Reliability of Decarbonized Power Grids via Optimal Utilization.* MIT Center for Energy and Environmental Policy Research (CEEPR) Research Workshop. Cambridge, MA, May 2022.
17. *Adaptive Optimization and Learning for Daily Operation of Clean Power Systems*. MIT Future Energy System Center Research Symposium. Cambridge, MA, Apr. 2022.
18. *The Power Grid: Future Build, Operational, and Resiliency Requirement.* MIT Energy Initiative Annual Research Meeting. Cambridge, MA, Nov. 2021.
19. *Algorithmic Development for Solving Large-Scale SCACOPF with UC and Line Switching.* ARPA-E Grid Optimization Outreach Meeting. Oct. 2021.
20. *Recent advances in small signal stability in power grids: New certificate, impact of damping, and Braess's Paradox.* National Renewable Energy Laboratory (NREL) Resilient Autonomous Energy Systems Workshop. Sept. 2021.
21. *A two-level ADMM for AC-OPF with global convergence guarantees.* SIAM Conference on Optimization. July 2021.
22. *A New EV-based Mobility System with Dynamic and Environment-Aware Electric Grid Planning and Policy Study.* EPICenter Vehicle-Grid Summer Research Symposium. Georgia Tech. June 2021.
23. *Adaptive robust multi-period AC optimal power flow problem.* IEEE Power & Energy System Society Best Paper Award Ceremony, Mar 2021.
24. *Addressing uncertainty, variability, and risk via power markets and operations.* Midcontinental ISO Market Symposium, Oct. 2020.
25. *A new algorithm for solving multistage stochastic unit commitment.* IEEE Power & Energy System Society General Meeting, July 2020.
26. *Challenges and progresses in electric energy systems: an overview of interdisciplinary research and collaboration in OR and PES.* IEEE Power & Energy System Society General Meeting, July 2020.
27. *A practical algorithmic framework for solving SCOPF.* IEEE Power & Energy System Society General Meeting, July 2020.
28. *A practical algorithmic framework for solving real-world security-constrained AC optimal power flow problems.* ARPA-E Grid Optimization (GO) Competition Challenge 1 Outreach Meeting, Feb. 2020.
29. *New advances in distributed and multistage optimization with connection to robust operations of modern power grids.* NeurIPS, Workshop on Safety and Robustness in Decision Making, Dec. 2019.
30. *New algorithms for distributed and multistage optimization.* INFORMS Annual Meeting, Oct. 2019.

31. *New methodologies for dynamic decentralized decision making in power systems.* Panel session with NSF CAREER awardees, IEEE Power and Energy Society General Meeting, Aug. 2019.
32. *A two-level distributed algorithm for constrained nonconvex programs with global convergence.* International Conference on Continuous Optimization (ICCOPT), Berlin, Aug. 2019.
33. *Dual dynamical programming algorithms with Φ-conjugate duality.* Mini-symposium in new algorithms for multistage stochastic programming, International Conference on Stochastic Programming (ICSP), Trondheim, Norway, July 2019.
34. *Recent advances in multistage stochastic mixed integer programming.* Workshop for Mathematical Optimization of Systems Impacted by Rare, High-Impact, Random Events, Institute for Computational and Experimental Research in Mathematics, Providence, RI, Jun. 2019.
35. *New distributed algorithm for nonconvex network optimization.* The Mathematics of Energy Systems, Isaac Newton Institute, University of Cambridge, UK, Jan. 2019.
36. *A two-level distributed algorithm for constrained nonconvex nonsmooth optimization*. 2nd Georgia Tech Workshop on Optimization and Energy Systems, Nov. 2018.
37. *Distributed algorithms for nonconvex optimization over a network.* Allerton Conference, UIUC, Oct. 2018.
38. *Stochastic dual dynamic integer programming.* EURO2018, Valentia, Spain, July 2018.
39. *Stochastic dual dynamic integer programming.* ISMP, Bordeaux, France, July, 2018.
40. *Recent advances in efficient algorithms for power grid optimization and topology control.* Invited speaker at Societal Networks Workshop, Simons Institute, U.C. Berkeley, Mar. 2018.
41. *Real-time optimization for highly constrained uncertain Dynamical decision making with applications in power systems*, NSF Workshop on Real-Time Learning and Decision Making in Dynamical Systems, Feb 2018.
42. *Matrix minor reformulation and SOCP-based relaxation for AC OPF problem.* Invited speaker at Semi-Algebraic Techniques for Optimal Power Flow and Stability Assessment, RTE (French National Electric Power Grid Operator), Versailles, France, Jan. 2018.
43. *DC and AC optimal transmission switching problems: New formulation and strong relaxation.* Invited speaker at Optimization and Inference of Physical Flows on Networks Workshop, Banff, Canada, Mar. 2017.
44. *Strong convex relaxations and global optimization for AC optimal power flow.* Invited speaker at Grid Science Winter School & Conference, Santa Fe, NM, Jan, 2017.
45. *Adaptive robust optimization for AC optimal power flow.* INFORMS ICS Conference, Austin, TX, Jan. 2017.

46. *Robust and decentralized operations for managing renewable generation and demand response in large-scale distribution systems.* PSERC Industry-University Meeting, Georgia Tech, Atlanta, Dec. 2016.
47. *Solving large-scale optimal power flow problems in electric power systems.* International Conference on Continuous Optimization (ICCOPT), Tokyo, Japan, Aug. 2016.
48. *New operation tools for improving flexibility and reliability of systems with variable resources and storage devices.* PSERC Industry-University Meeting, GE Research Center, NY, June 2016.
49. *Solving fundamental optimization problems for renewable integration, maintenance, and optimal power flow.* North America Chinese Power Professional Association (NACPPA) Webinar Series, June 2016.
50. *Solving large-scale optimization problems under uncertainty and non-convexity.* Invited speaker in CORE 50th Anniversary Workshop, Belgium, May 2016.
51. *New optimization models and algorithms for power grid operations.* Sandia National Labs and Georgia Tech Alliance Workshop, Georgia Tech, Atlanta, Apr. 2016.
52. *Robust and decentralized operations for managing renewable generation and demand response in large-scale distribution systems.* PSERC Industry-University Meeting. College Station, TX. Dec. 2015.
53. *Adaptive robust optimization for electric power system operations.* ISO New England, Holyoke, MA. Aug. 2015.
54. *SOCP relaxations for the optimal power flow problem.* International Symposium on Optimization (ISMP), Jul. 2015.
55. *Strong SOCP relaxations for the optimal power flow problem.* FERC Annual Conference, Jun. 2015.
56. *Advanced optimization for power systems.* Southern Company, Birmingham, AL, May 2015.
57. *Adaptive robust optimization for electric power system operations*. SIAM Conference on Computational Science and Engineering, Salt Lake City, UT, Mar. 2015.
58. *Adaptive robust optimization for daily power system operations.* Power Systems Computation Conference, Aug. 2014
59. *Adaptive robust economic dispatch with dynamic uncertainty sets for significant wind*. IEEE Power System Society General Meeting, Panel Session. June 2014.
60. *Multistage robust unit commitment,* Technical Conference: Increasing Real-Time and Day-Ahead Market Efficiency through Improved Software, Federal Energy Regulatory Commission (FERC), June 2014.
61. *Adaptive robust economic dispatch with dynamic uncertainty sets for significant wind,* INFORMS Manufacturing & Service Operations Management Conference (MSOM), June 2014.

62. *Robust optimization in electric power systems*. IEEE Power & Energy Systems Roundtable Meeting, School of Electrical and Computer Engineering, Georgia Institute of Technology, Apr. 2014.
63. *Security-constrained OPF with sparse regularization*, INFORMS Annual Meeting, Minneapolis MN, Nov. 2013.
64. *Adaptive robust optimization and dynamic uncertainty sets for economic dispatch*, INFORMS Annual Meeting, Minneapolis MN, Nov. 2013.
65. *Security-constrained OPF with sparse regularization*, Technical Conference: Increasing Real-Time and Day-Ahead Market Efficiency through Improved Software, Federal Energy Regulatory Commission (FERC), June 2013.
66. *Robust optimal stopping problem*, INFORMS Annual Meeting, Phoenix, AZ, 2012.
67. *Fully distributed optimal power flow*, INFORMS Annual Meeting, Phoenix, AZ, 2012.
68. *Adaptive robust optimization for security constrained unit commitment problem*, International Symposium of Mathematical Programming (ISMP), Berlin, Germany 2012.
69. *A fairness-based proposal for electricity market design*, INFORMS Manufacturing & Service Operations Management Conference (MSOM), New York, NY, Jul. 2012.
70. *Two-stage robust optimization for security constrained unit commitment problems*, George B. Dantzig Dissertation Award Presentation, INFORMS Annual Meeting, Charlotte, NC, Nov. 2011.
71. *Adaptive robust optimization for electric energy system operation*, Optimization Days, HEC Montreal, Canada, May 2011.
72. *Adaptive robust optimization for security constrained unit commitment problems*, Seventh Annual Carnegie Mellon Conference on the Electricity Industry, Carnegie Mellon University, Pittsburgh, PA, March 2011.
73. *An analytical approach for fantasy football draft and lineup management*, INFORMS Annual Meeting, Austin, TX, Oct. 2010.
74. *A Fairness-based proposal for electricity market design*, INFORMS Annual Meeting, Austin, TX, 2010.
75. *A geometric characterization of the power of finite adaptability in multi-stage stochastic and adaptive optimization*. Modern Trends in Optimization and Its Applications - Workshop IV Robust Optimization, Institute for Pure and Applied Mathematics, University of California, Los Angeles, Apr. 2010.
76. *Accelerated First-Order Algorithms for Polynomial Optimization*, INFORMS Annual Meeting, San Diego, CA, Oct. 2009.

D2. Invited Seminar Presentations

1. *Challenges and Progresses in Electric Energy Systems,* Department of Electrical and Computer Engineering, Iowa State University, Iowa State. Feb 27, 2024.
2. *Dual Dynamic Programming for Multistage Optimization under Uncertainty,* School of Management, Technical University of Munich, April 22, 2024.

3. *Decarbonization and Optimization of the U.S. Power Grids.* Asian Americans in Energy, the Environment, and Commerce (AE2C) Seminar. Apr. 2023.
4. *Solving Large-Scale Power Grid Optimization Problems.* Clemson Operations Research Institute Seminar. Clemson University. Apr. 2023.
5. *Electric Power Systems Operations and Planning In Energy System Transition.* CaSE Graduate Seminar, Johns Hopkins University. Oct. 2022.
6. *Overview of Research in Power System Optimization.* Special Seminar, ISO New England. May, 2022.
7. *Electric Power Systems Operations and Planning In Energy System Transition.* Interdisciplinary Seminar Series, Clean Energy Institute, University of Washington, Apr. 2022.
8. *Electric Power Systems Operations and Planning in the Great Transition.* MIT EESG Seminar. Mar. 2022.
9. *Electric Power Systems in Transition to Net-Zero Emissions: Operations and Planning.* MIT Operations Research Center, IAP Seminar. Jan. 2022.
10. *Challenges and progresses in electric energy systems from fundamental research to industry practices and future directions.* IEEE Power and Energy Society Webinar. Nov. 2021.
11. *Dual Dynamic Programming Algorithms for Multistage Stochastic Optimization: Complexity Analysis and Application.* School of Computing and Augmented Intelligence, Arizona State University. Sept. 2021.
12. *Recent Advances in Large-Scale Power Grid Optimization under Uncertainty.* Dept. IE, University of Pittsburgh. Mar. 2021.
13. *New Algorithms and Complexity Analysis of Multistage Stochastic and Distributionally Robust Optimization.* Engineering Management, Information, and Systems, Southern Methodist University. Mar. 2021.
14. *Challenges in Handling Uncertainty and Intermittency in a Net-Zero Electric Power System. Circular Carbon Fuels Economy Working Group Seminar.* Georgia Institute of Technology. Feb. 2021.
15. *Solving Real-World Power Grid Optimization Problems.* Dept. IE, University of Houston. Oct. 2020.
16. *Efficient algorithms for network structured optimization problems with non-convex constraints.* Center for Nonlinear Studies. Los Alamos National Lab. Feb, 2020.
17. *New advances in distributed computation for network constrained optimization with applications in power systems.* Dept. ISE, University of Tennessee, Knoxville, Sept. 2019.
18. *New advances in network constrained nonconvex optimization with applications to power systems.* ECE, University of Texas, Austin, Apr. 2019.
19. *New advances in distributed and stochastic optimization over a network.* Division of Systems Engineering, Boston University, Mar. 2019.
20. *Strong convexification and distributed algorithms for constrained nonconvex optimization with applications to AC optimal power flow*, Departmental Seminar, ECE, University of Texas at San Antonio, Oct. 2018.

21. *Recent advances in dynamic decision making for renewable energy integration and flexible load management,* Management Science and Engineering, Stanford University, May 2018.
22. *Strong convex relaxation for optimal power flow problem.* Departmental seminar, Integrated Systems Engineering, Ohio State University, April 2018.
23. *Solvability of power flow equations through complex analysis,* Departmental Seminar, Industrial & Operations Engineering, University of Michigan, Mar. 2018.
24. *Solving the computational challenges in electrical power systems,* Departmental Seminar, Industrial & Systems Engineering, University of Michigan, Sept. 2017.
25. *Solving large-scale optimization problems under uncertainty and non-convexity in electric power systems.* Departmental Seminar, Industrial Engineering, Tsinghua University, Beijing, China, Dec 2016.
26. *Recent advances in solving AC OPF and multistage robust unit commitment.* Departmental Seminar, Electrical Engineering, Tsinghua University, Beijing, China, Dec 2016.
27. *Solving AC OPF in electric power systems.* Departmental Seminar, Industrial Engineering, University of California, Berkeley, Apr. 2016.
28. *Solving large-scale optimization problems under uncertainty and non-convexity in electric power systems.* ISE Seminar, Lehigh University. Sep. 2015.
29. *Robust dispatch and dynamic uncertainty sets for power systems with significant wind*. Sandia National Labs, Livermore, CA, Nov. 2014.
30. *Adaptive robust optimization in power system operations*. Colloquium of Applied Mathematics, Cornell University, Sept. 2014.
31. *Two-stage and multistage robust optimization in power systems.* Seminar, Department of Industrial and Enterprise Systems Engineering, University of Illinois at Urbana-Champaign, May 2014.
32. *Robust optimization in power systems*. GERAD-ONDI seminar, Polytechnique Montreal, Canada, Mar. 2014.
33. *Robust optimization in power systems.* Tsinghua University, Department of Electrical Engineering, Beijing, June 2013.
34. *Adaptive robust optimization for unit commitment Problem*. Department of Electrical & Computer Engineering, Texas A&M University, Mar. 2013.
35. *Recent Advances in Electric Power Systems.* School of Industrial & Systems Engineering, Georgia Institute of Technology, Nov. 2011.

V. TEACHING

A. INDIVIDUAL STUDENT GUIDANCE

A1. Postdocs

- Xin Chen. Fall 2022 – Fall 2023
    - PhD from Harvard University
    - MIT Energy Initiative (MITEI)

    - First placement: Assistant Professor, Dept. Electrical and Computer Engineering, Texas A&M University, 2023.
- Dirk Lauinger. Fall 2022 – July 2024
    - PhD from EPFL
    - MIT Sloan School of Management & MITEI

A2. Ph.D. Students

A.2.a. Graduated from Georgia Tech

- Ph.D. Student: Alvaro Lorca. Spring 2013 – Spring 2016
    - Topic: Adaptive robust optimization and applications in power system operations
    - Supervised paper won the **Third Place in INFORMS Junior Faculty Interest Group (JFIG) Paper Competition 2014; INFORMS Energy Natural Resources and Environment (ENRE) Best Student Paper Competition, Finalist 2016.**
    - First placement: Assistant Professor, Departments of Industrial Engineering and Electrical Engineering, Catholic University of Chile, Aug 2016.
- Ph.D. Student: Murat Yildirim. Fall 2013 – Spring 2016
    - Co-Advisor: Dr. Nagi Gebraeel
    - Topic: Maintenance scheduling of generation with conditional monitoring
    - Supervised paper was selected as a **Finalis**t in **INFORMS Data Mining Society Best Student Paper Competition 2015; Finalist in INFORMS Quality, Statistics, and Reliability Best Student Paper Competition, 2016.**
    - First placement: Assistant Professor, Department of Industrial Engineering, Wayne State University, 2017.
- Ph.D. Student: Burak Kocuk. Fall 2013 – Spring 2016
    - Co-Advisor: Dr. Santanu Dey
    - Topic: Optimal power flow and convex relaxation
    - First placement: Assistant Professor, Department of Industrial Engineering, Sabanci University, Turkey, 2017.
- Ph.D. Student: Jikai Zou. Fall 2013 – Spring 2017
    - Co-Advisor: Dr. Shabbir Ahmed
    - Topic: Multistage stochastic optimization and applications in energy system strategic planning
    - First placement: Amazon, Seattle, WA.
- Ph.D. Student: Bai Cui. Fall 2016 – Fall 2018
    - Co-Advisor: Dr. Sakis Meliopoulos
    - Topic: Voltage stability in power systems
    - First placement: Assistant Professor, Department of Electrical Engineering, Iowa State University.
- Ph.D. Student: Amin Gholami. Fall 2017 – Dec 2021

    - Topic: Power system stability in distribution and multi-microgrid systems.
    - **Winner of Fellowship for Excellence in Research in Energy and Sustainable Systems, ISyE, Georgia Tech, 2021.**
    - First placement: Walmart Research Lab, USA.
- Ph.D. Student: Kaizhao Sun. Fall 2017 – 2021
    - Topic: Distributed nonconvex optimization and applications in electricity market coordination.
    - First placement: Damo Lab, Alibaba, USA.
- Ph.D. Student: Shixuan Zhang. Fall 2017 – 2022
    - Topic: Multistage robust and stochastic optimization. Nonconvex quadratic optimization.
    - **Honorable Mention in INFORMS Optimization Society Best Student Paper Award, 2021.**
    - First placement: Assistant Professor, Department of Industrial Engineering, Texas A&M University, 2023.
- Ph.D. Student: Filipe Cabral. Fall 2019 – 2023
    - Topic: Infinite horizon stochastic optimization and multi-modal transportation system electrification.
    - First placement: American Airline, operations research group, 2023.

A.2.b. In Process

- Ph.D. Student: Thomas Lee. Fall 2022 – Present
    - MIT IDSS
    - Topic: Large-scale power grid optimization and storage.
- Ph.D. Student: Matthew Brun. Fall 2022 – Present
    - MIT Operations Research Center
    - Topic: Unit commitment and AC OPF, Battery supply chain recycling.
- Ph.D. Student: Robin Legault. Fall 2023 – Present
    - MIT Operations Research Center
    - Topic: Integer programming and electrification of transportation.
- Ph.D. Student: Baptiste Rabecq. Fall 2023 – Present
    - MIT Operations Research Center
    - Topic: Stochastic programming for ISO capacity markets.
- Ph.D. Student: Luc Cote. Fall 2024 – Present
    - MIT Operations Research Center
    - Topic: Carbon pricing for transition of electricity systems.

A3. M.S. Students

A3.a. Graduated M.S. Non-thesis

- M.S. Student: Ramon Auad. Fall 2016 – Spring 2017
    - Topic: Representation of deep neural network

    - Graduated in Spring 2017
- M.S. Student: Johannes Milz. Spring 2017
    - Topic: Convex dependency of cooperative initial value problem.
    - Graduated in Spring 2017
- M.S. Student: Wenlu Fu. Fall 2013 – Spring 2014
    - Topic: Unit commitment problem in electric power systems
    - Graduated in Summer 2014

A3.b. Graduated M.S. thesis

- M.S. Student: David Fersztand. Fall 2023 – Fall 2024
    - MIT, Operations Research Center
    - Thesis title: Improved Complexity Analysis for the Proximal Bundle Algorithm Under a Novel Perspective
- M.S. Student: Adam Barber. Fall 2022 – Fall 2023
    - MIT, Leaders for Global Operations Program (LGO)
    - Thesis title: Machine Learning for Scalable Predictive Modeling of Residential Customer Electric Vehicle Energy Demand Using Telematic Data and Temperature

A3.c. In Process

- M.S. Student: Mark Patrick Serbent. Fall 2024 – Present
    - MIT, Leaders for Global Operations Program (LGO)
    - Proposed thesis title: Gas Network Preparations for Networked Geothermal

A4. Undergraduate Students

- Undergraduate Student: Hongfan Chen. Spring 2013 – Spring 2014
    - Project: Demand response portfolio management via robust optimization
    - Georgia Tech President's Undergraduate Research Award 2013 and 2014
    - Supervised paper is awarded the **Winner of INFORMS Undergraduate Operations Research Prize 2014.**
- Undergraduate Student: Hongzhao Guan. Fall 2015-Spring 2016.
    - Project: Extremal ellipsoid and efficient algorithm
- Undergraduate Student: Nolan Hackett. Fall 2015 – Spring 2016.
    - Project: Power system generation expansion
- Undergraduate Student: Kyung J. Kim. Spring 2016.
    - Project: Fantasy football draft and lineup management
- Undergraduate Student: Kaizhao Sun. Spring 2016.
    - Project: Introduction to robust optimization

B. OTHER TEACHING ACTIVITIES

B1. Course Development

- Spring 2022, developing a new graduate level course: Energy System Optimization, Sloan School of Management, MIT.
- Spring 2017, developed a new PhD level course: Modern optimization for energy and complex engineering systems. ISyE, Georgia Tech
- Spring 2016, developed a new PhD level course: Advanced optimization for electric power systems. ISyE, Georgia Tech

B2. Course Improvement

- MIT 15.060: Data, Model, Decision. Fall 2022, 2023, MIT.
- ISyE 6673: Financial Optimization. Developed new syllabus.
- ISyE 6230: Economic Decision Analysis. Developed several interactive games and an online electricity market trading game.
- ISyE 4133: Advanced Optimization. Developed extensive lecture notes. Highly praised by students. Plan to develop into a textbook.

B3. MIT Sloan Programs

- **MBAn** capstone project: Laura Li & Meredith Gao. CMA CGA. Spring 2024.
- **MBAn** capstone project: Kaiyuan (Kevin) Sheng & Sheng (Sean) Huang. Assured Guaranty. Spring 2024.
- **MBAn** capstone project: Michael Jiang & Bolin Song. HyAxiom Doosan. Spring 2023.
- **MBAn** capstone project: Dalal Alramadhan & Nikita Singh. BMW. Spring 2023.
- **MBAn** capstone project: Dev Das & James Hennessy. Thermo Fisher. Spring 2022.

VI. SERVICE

A. PROFESSIONAL CONTRIBUTIONS

A1. Editorial Board Membership

- **Manufacturing & Service Operations Management (MSOM)**, Associate Editor, 2022 – present.
- **IEEE Transactions on Control of Network Systems**, Associate Editor, 2019 - present.
- **IEEE Transactions on Sustainable Energy**, special issue "Emerging optimization techniques in renewable energy system planning, design, operation, and control" 2016 (Impact Factor: 3.727)
- **IET Generation Transmission & Distribution**, special issue on "Distributed & autonomous dispatch and control for active distribution networks/microgrids potential scheme to realize plug & play of DER" 2016 (Impact Factor: 1.576, 5-year Impact Factor: 2.011)

A2. Society Leadership and Membership

- Secretary/Treasurer, INFORMS Optimization Society, 2019/1-2023/11

- Members of Institute for Operations Research and Management Science (INFORMS), Mathematical Optimization Society (MOS), Society of Industrial and Applied Mathematics (SIAM), and IEEE Power & Energy Society (IEEE PES)

A3. Chairmanship of Technical Sessions and Conferences

- Founding Chair, Annual Georgia Tech Workshop on Energy Systems and Optimization, 2017, 2018, 2019, 2020.
- Panel Session Chair, IEEE Power & Energy Society General Meeting, Aug 2019.
- Co-Chair, Award Committee for the Best Publication in Energy Award for INFORMS Energy, Natural Resources, and Environment (ENRE) Section, 2018.
- Cluster Chair, INFORMS Annual Meeting, ENRE Electricity Track, 2017.
- Cluster Chair, INFORMS Annual Meeting, ENRE Electricity Track, 2016.
- Cluster Chair, INFORMS Annual Meeting, ENRE Electricity Track, 2015.
- Panel Chair for IEEE Power & Energy Society General Meeting
  - Robust optimization in power systems, July 2014
- Co-Chair, Award Committee for the Best Student Paper Award for INFORMS ENRE Section, 2014

A4. Technical Journal or Conference Referee Activities

A4.a. Referee for Journals

- Operations Research
- Mathematical Programming A & B
- European Journal of Operations Research
- Operations Research Letters
- Optimization Methods and Software
- IIE Transactions
- Naval Research Logistics
- Computational Management Science
- Mathematical Methods of Operations Research
- IEEE Transactions on Power Systems
- IEEE Transactions on Smart Grid
- IEEE Transactions on Automatic Control
- IEEE Transactions on Control of Networked Systems

A4.b. Referee for Conferences and others

- IEEE Conference on Decision and Control (CDC), 2020
- Power Systems Computation Conference (PSCC), 2015, 2017, 2019
- Modeling and Optimization: Theory and Applications (MOPTA). 2013
- IEEE Symposium on Information Processing in Smart Grid 2013

A5. Proposal Panels and Reviews

- External reviewer for NSF, ARPA-E, DOE, 2018, 2019, 2020.

- External reviewer for Army Research Lab, 2017.
- External reviewer for National Council for Research and Technology of Greece, ARISTEIA program, 2013