

# Curriculum Vitae

Joshua Adam Taylor

## Contact Information

josh.taylor@utoronto.ca  
<http://www.ele.utoronto.ca/~jttaylor>

10 King's College Road  
Sandford Fleming Building, Room 1021C  
Toronto, ON M5S 3G4, Canada

## Education

**Massachusetts Institute of Technology**, Cambridge, MA  
PhD, Mechanical Engineering, May 2011  
SM, Mechanical Engineering, June 2008

**Carnegie Mellon University**, Pittsburgh, PA  
BS, Mechanical Engineering, June 2006

## Employment

**University of Toronto**, Electrical and Computer Engineering  
*Assistant professor*, January 2013 - present  
*Associate director, Institute for Sustainable Energy*, July 2015 - present

**University of California, Berkeley**, Electrical Engineering and Computer Sciences  
*Postdoctoral scholar*, July 2011 - December 2012

**Massachusetts Institute of Technology**, Mechanical Engineering  
*Graduate research assistant*, Fall 2006 - June 2011

**Carnegie Mellon University**, Mechanical Engineering  
*Undergraduate research assistant*, Summer 2003 - Spring 2006

**Naval Surface Warfare Center Carderock Division**, Bethesda, MD  
*Intern*, Summer 2005

## Publications

### Books and book chapters

- B1. J.A. Taylor. *Convex optimization of power systems*. Cambridge University Press, 2015
- B2. J.A. Taylor and J.L. Mathieu. “Uncertainty in Demand Response – Identification, Estimation, and Learning”. In: *The Operations Research Revolution*. Tutorials in Operations Research. INFORMS, 2015. Chap. 5, pp. 56–70. DOI: 10.1287/educ.2015.0137

### Journal

- J1. A. Stupar, T. Mcrae, N. Vukadinovic, A. Prodic, and J.A. Taylor. “Multi-objective optimization of multi-level DC-DC converters using geometric programming”. In: *Power Electronics, IEEE Transactions on* (2018). Submitted
- J2. S. Delikaraoglou, J.A. Taylor, and P. Pinson. “Direct current flowgate transmission rights”. In: *IEEE Power Engineering Letters* (2018). Submitted
- J3. A. Lesage-Landry and J.A. Taylor. “Dispatching partially observed loads”. In: *Power Systems, IEEE Transactions on* (2018)
- J4. A.S. Zamzam, E. Dall’Anese, C. Zhao, J.A. Taylor, and N.D. Sidiropoulos. “Optimal Water-Power Flow Problem: Formulation and Distributed Optimal Solution”. In: *Control of Network Systems, IEEE Transactions on* (2017). DOI: 10.1109/TCNS.2018.2792699
- J5. M. Bazrafshan, N. Gatsis, A. Taha, and J.A. Taylor. “Coupling Optimal Power Flow with Transient Stability”. In: *Smart Grid, IEEE Transactions on* (2017)
- J6. B. Vellaboyana and J.A. Taylor. “Optimal decentralized control of DC-segmented power systems”. In: *Automatic Control, IEEE Transactions on* (2017). DOI: 10.1109/TAC.2018.2796620
- J7. A. Lesage-Landry and J. A. Taylor. “The Multi-armed Bandit with Stochastic Plays”. In: *Automatic Control, IEEE Transactions on* (2017). DOI: 10.1109/TAC.2017.2765501
- J8. D. Fooladivanda and J.A. Taylor. “Energy-Optimal Pump Scheduling and Water Flow”. In: *Control of Network Systems, IEEE Transactions on* (2017). DOI: 10.1109/TCNS.2017.2670501
- J9. S.F. Barot and J.A. Taylor. “A concise, approximate representation of a collection of loads described by polytopes”. In: *International Journal of Electrical Power & Energy Systems* 84 (2017), pp. 55–63. DOI: 10.1016/j.ijepes.2016.05.001
- J10. J. A. Taylor, N. Luangsomboon, and D. Fooladivanda. “Allocating Sensors and Actuators via Optimal Estimation and Control”. In: *Control Systems Technology, IEEE Transactions on* 25.3 (May 2017), pp. 1060–1067. DOI: 10.1109/TCST.2016.2575799
- J11. J.A. Taylor, J.L. Mathieu, D.S. Callaway, and K. Poolla. “Price and capacity competition in balancing markets with energy storage”. In: *Energy Systems* 8.1 (2017), pp. 169–197. DOI: 10.1007/s12667-016-0193-9
- J12. J.A. Taylor, S.V. Dhople, and D.S. Callaway. “Power systems without fuel”. In: *Renewable and Sustainable Energy Reviews* 57 (May 2016), pp. 1322–1336. DOI: 10.1016/j.rser.2015.12.083
- J13. S. Sun, B. Liang, M. Dong, and J. A. Taylor. “Phase Balancing Using Energy Storage in Power Grids Under Uncertainty”. In: *IEEE Transactions on Power Systems* 31.5 (Sept. 2016), pp. 3891–3903. DOI: 10.1109/TPWRS.2015.2492359
- J14. S. Pirooz Azad, J.A. Taylor, and R. Iravani. “Decentralized Supplementary Control of Multiple LCC-HVDC Links”. In: *Power Systems, IEEE Transactions on* 31.1 (Jan. 2016), pp. 572–580. DOI: 10.1109/TPWRS.2015.2393372

- J15. J.A. Taylor. “Financial storage rights”. In: *Power Systems, IEEE Transactions on* 30.2 (Mar. 2015), pp. 997–1005. DOI: 10.1109/TPWRS.2014.2339016
- J16. J.A. Taylor and J.L. Mathieu. “Index Policies for Demand Response”. In: *Power Systems, IEEE Transactions on* 29.3 (May 2014), pp. 1287–1295. DOI: 10.1109/TPWRS.2013.2289972
- J17. J.A. Taylor, A. Nayyar, D.S. Callaway, and K. Poolla. “Consolidated Dynamic Pricing of Power System Regulation”. In: *Power Systems, IEEE Transactions on* 28.4 (Nov. 2013), pp. 4692–4700. DOI: 10.1109/TPWRS.2013.2268391
- J18. J.A. Taylor, D.S. Callaway, and K. Poolla. “Competitive energy storage in the presence of renewables”. In: *Power Systems, IEEE Transactions on* 28.2 (May 2013), pp. 985–996. DOI: 10.1109/TPWRS.2012.2210573
- J19. J.A. Taylor and F.S. Hover. “Conic AC transmission system planning”. In: *Power Systems, IEEE Transactions on* 28.2 (May 2013), pp. 952–959. DOI: 10.1109/TPWRS.2012.2214490
- J20. J.A. Taylor and F.S. Hover. “Convex Models of Distribution System Reconfiguration”. In: *Power Systems, IEEE Transactions on* 27.3 (Aug. 2012), pp. 1407–1413. ISSN: 0885-8950. DOI: 10.1109/TPWRS.2012.2184307
- J21. J.A. Taylor and F.S. Hover. “Laplacians for flow networks”. In: *SIAM J. of Disc. Math.* 25.3 (2011), pp. 1349–1364. DOI: DOI:10.1137/100787726
- J22. J.A. Taylor and F.S. Hover. “Linear Relaxations for Transmission System Planning”. In: *Power Systems, IEEE Transactions on* 26.4 (Nov. 2011), pp. 2533–2538. ISSN: 0885-8950. DOI: 10.1109/TPWRS.2011.2145395
- J23. G.F. Christopher, N.N. Noharuddin, J.A. Taylor, and S.L. Anna. “Experimental observations of the squeezing-to-dripping transition in T-shaped microfluidic junctions”. In: *Phys. Rev. E* 78.3 (Sept. 2008), p. 036317. DOI: 10.1103/PhysRevE.78.036317

## Conference

- C1. A.S. Mohamed, A. Lesage-Landry, and J.A. Taylor. “Dispatching Thermostatically Controlled Loads for Frequency Regulation Using Adversarial Multi-armed Bandits”. In: *IEEE Electrical Power and Energy Conference*. Oct. 2017
- C2. R. Henriquez, A. Lesage Landry, J.A. Taylor, D. Olivares, and M. Negrete-Pincetic. “Managing load contract restrictions with online learning”. In: *Signal and Information Processing (GlobalSIP), IEEE Global Conference on*. Dec. 2017
- C3. Y. Tian, N. Li, and J.A. Taylor. “Harmonic Reduction via Optimal Power Flow and the Frequency Coupling Matrix”. In: *Control Technology and Applications, IEEE Conference on*. Aug. 2017, pp. 2150–2157. DOI: 10.1109/CCTA.2017.8062771
- C4. A. Lesage Landry and J.A. Taylor. “Online Convex Optimization for Demand Response”. In: *Bulk Power Systems Dynamics and Control Symposium (IREP)*. Aug. 2017
- C5. A. Lesage Landry and J.A. Taylor. “Learning to shift thermostatically controlled loads”. In: *Hawaii International Conference on System Sciences*. Jan. 2017. DOI: hdl.handle.net/10125/41522
- C6. Y. Tian and J. A. Taylor. “Sparsity-promoting controller design for VSC-based microgrids”. In: *Signal and Information Processing (GlobalSIP), IEEE Global Conference on*. Dec. 2016, pp. 836–840. DOI: 10.1109/GlobalSIP.2016.7905960
- C7. S. Barot and J.A. Taylor. “An outer approximation of the Minkowski sum of convex conic sets with application to demand response”. In: *Decision and Control (CDC), IEEE 55th Annual Conference on*. Dec. 2016, pp. 4233–4238. DOI: 10.1109/CDC.2016.7798912
- C8. M. Bazrafshan, N. Gatsis, A. Taha, and J.A. Taylor. “Augmenting the optimal power flow for stability”. In: *Decision and Control (CDC), IEEE 55th Annual Conference on*. Dec. 2016,

- pp. 4104–4109. DOI: 10.1109/CDC.2016.7798891
- C9. A. Stupar, T. Mcrae, N. Vukadinovic, A. Prodic, and J.A. Taylor. “Multi-Objective Optimization and Comparison of Multi-Level DC-DC Converters using Convex Optimization Methods”. In: *European Conference on Power Electronics and Applications*. Sept. 2016, pp. 1–10. DOI: 10.1109/EPE.2016.7695665
- C10. A. Stupar, J.A. Taylor, and A. Prodic. “Posynomial Models of Inductors for Optimization of Power Electronic Systems by Geometric Programming”. In: *IEEE Workshop on Control and Modeling for Power Electronics (COMPEL)*. June 2016, pp. 1–8. DOI: 10.1109/COMPEL.2016.7556660
- C11. J.L. Mathieu and J.A. Taylor. “Controlling Nonlinear Batteries for Power Systems: Trading Off Performance and Battery Life”. In: *Power Systems Computation Conference*. June 2016, pp. 1–7. DOI: 10.1109/PSCC.2016.7540856
- C12. J.A. Taylor and J.L. Mathieu. “Strategic Bidding in Electricity Markets with Only Renewables”. In: *American Control Conference*. July 2016, pp. 5885–5890. DOI: 10.1109/ACC.2016.7526592
- C13. D. Fooladivanda and J.A. Taylor. “Optimal pump scheduling and water flow in water distribution networks”. In: *Decision and Control (CDC), IEEE 54th Annual Conference on*. Dec. 2015, pp. 5265–5271. DOI: 10.1109/CDC.2015.7403043
- C14. D. Fooladivanda and J.A. Taylor. “Dispatching thermal power plants under water constraints”. In: *53rd Annual Allerton Conference on Communication, Control, and Computing*. Sept. 2015, pp. 396–401. DOI: 10.1109/ALLERTON.2015.7447031
- C15. B.R. Vellaboyana, A. Oroojlooyjadid, D. Fooladivanda, J.A. Taylor, and L.V. Snyder. “Optimal scheduling of networked energy storages”. In: *Signal and Information Processing (GlobalSIP), IEEE Global Conference on*. Dec. 2015, pp. 982–986. DOI: 10.1109/GlobalSIP.2015.7418344
- C16. S. F. Barot and J.A. Taylor. “Load aggregation for demand response using polytopic models and the Minkowski sum”. In: *CIGRÉ Canada Conference*. Aug. 2015
- C17. S. Sun, J.A. Taylor, M. Dong, and B. Liang. “Distributed Real-Time Phase Balancing for Power Grids with Energy Storage”. In: *American Control Conference*. July 2015, pp. 3032–3037. DOI: 10.1109/ACC.2015.7171798
- C18. J.A. Taylor and L. Scardovi. “Decentralized control of DC-segmented power systems”. In: *Communication, Control, and Computing, 52nd Annual Allerton Conference on*. Invited. Sept. 2014, pp. 1046–1050. DOI: 10.1109/ALLERTON.2014.7028570
- C19. J.A. Taylor. “Financial rights and tracing for energy storage”. In: *PES General Meeting*. July 2014, pp. 1–5. DOI: 10.1109/PESGM.2014.6938936
- C20. J.A. Taylor and J.L. Mathieu. “Index Policies for Demand Response Under Uncertainty”. In: *Decision and Control (CDC), IEEE 52nd Annual Conference on*. Invited. Dec. 2013, pp. 6262–6267. DOI: 10.1109/CDC.2013.6760879
- C21. A. Nayyar, J.A. Taylor, A. Subramanian, D.S. Callaway, and K. Poolla. “Aggregate flexibility of collections of loads”. In: *Decision and Control (CDC), IEEE 52nd Annual Conference on*. Invited. Dec. 2013, pp. 5600–5607. DOI: 10.1109/CDC.2013.6760772
- C22. J.A. Taylor, A. Nayyar, D.S. Callaway, and K. Poolla. “Dynamic pricing in consolidated ancillary service markets”. In: *European Control Conference*. July 2013, pp. 3032–3037
- C23. A. Subramanian, J.A. Taylor, E. Bitar, D. Callaway, K. Poolla, and P. Varaiya. “Optimal power and reserve capacity procurement policies with deferrable loads”. In: *Decision and Control (CDC), IEEE 51st Annual Conference on*. Dec. 2012, pp. 450–456. DOI: 10.1109/CDC.2012.6426102

- C24. J.A. Taylor, J.L. Mathieu, D.S. Callaway, and K. Poolla. “Price and capacity competition in zero-mean storage and demand response markets”. In: *50th Annual Allerton Conference on Communication, Control, and Computing*. Invited. 2012, pp. 1316–1323. DOI: 10.1109/Allerton.2012.6483370
- C25. J.A. Taylor, D.S. Callaway, and K. Poolla. “Inventory control of storage in distribution systems”. In: *American Control Conference*. June 2012, pp. 2147–2152. DOI: 10.1109/ACC.2012.6315148
- C26. J.A. Taylor and F.S. Hover. “Conic relaxations for transmission system planning”. In: *North American Power Symposium*. Aug. 2011, pp. 1–4. DOI: 10.1109/NAPS.2011.6024861
- C27. J.A. Taylor and F.S. Hover. “Lift-and-project relaxations of AC microgrid distribution system planning”. In: *Grand Challenges in Modeling and Simulation*. June 2011
- C28. J.A. Taylor, E. Gilbertson, J. Chalfant, and F.S. Hover. “Linear network design for AC shipboard distribution systems”. In: *IEEE Electric Ship Technologies Symposium*. Apr. 2011. DOI: 10.1109/ESTS.2011.5770866
- C29. J.A. Taylor and F.S. Hover. “Economical simulation in particle filtering using interpolation”. In: *Information and Automation, International Conference on*. June 2009, pp. 1326–1330. DOI: 10.1109/ICINFA.2009.5205122
- C30. J.A. Taylor, F.S. Hover, and A. Ouroua. “Uncertainty analysis of large-scale power systems using collocation”. In: *Grand Challenges in Modeling and Simulation*. June 2008
- C31. J. Langston, J.A. Taylor, F.S. Hover, J. Simpson, M. Steurer, and T. Baldwin. “Uncertainty analysis for a large-scale transient simulation of a notional all-electric ship pulse load charging scenario”. In: *Probabilistic Methods Applied to Power Systems*. May 2008
- C32. J.A. Taylor and F.S. Hover. “High Dimensional Stochastic Simulation and Electric Ship Models”. In: *Electric Ship Technologies Symposium*. May 2007, pp. 402–407. DOI: 10.1109/ESTS.2007.372117

## Theses

- T1. J.A. Taylor. “Conic optimization of electric power systems”. PhD thesis. Massachusetts Institute of Technology, 2011. URL: <http://dspace.mit.edu/handle/1721.1/67601>
- T2. J.A. Taylor. “Uncertainty analysis of power systems using collocation”. MA thesis. Massachusetts Institute of Technology, 2008. URL: <http://dspace.mit.edu/handle/1721.1/45891>

## Invited talks

- *Online learning for demand response*. Panel on Distributed Control, 9th Annual IEEE Green Technologies Conference. Denver, CO, Mar. 2017
- *Online learning for demand response*. Conference on Information Sciences and Systems, Johns Hopkins University. Baltimore, MD, Mar. 2017
- *Leveraging energy storage and demand response in power system operations*. Waterloo Institute for Sustainable Energy, University of Waterloo. Waterloo, ON, Mar. 2017
- *Power systems without fuel*. Keynote, Symposium on Signal and Information Processing for Smart Grid Infrastructures, GlobalSIP. Washington, DC, Dec. 2016
- *Leveraging energy storage and demand response in power system operations*. Pontificia Universidad Católica de Chile. Santiago, Chile, Oct. 2016
- *Leveraging energy storage and demand response in power system operations*. MAESTRO group, INRIA. Sophia-Antipolis, France, June 2016

- *Representing storage and demand response in power system operations*. Centre for Power and Information Research Showcase, University of Toronto. Toronto, ON, Apr. 2016
- *Representing storage and demand response in power system operations*. Mechanical & Industrial Engineering Colloquium, New Jersey Institute of Technology. Newark, NJ, Feb. 2016
- *Representing storage and demand response in power system operations*. Workshop on frontiers in distributed optimization and control of sustainable power systems, National Renewable Energy Laboratory. Boulder, CO, Jan. 2016
- *Strategic Price Bidding in Electricity Markets with Only Renewables*. INFORMS Annual Meeting. Philadelphia, PA, Nov. 2015
- *Representing storage and demand response in power system operations*. Control Seminar, University of Michigan. Ann Arbor, MI, Oct. 2015
- *Dispatching Thermal Power Plants under Water Constraints*. 53rd Annual Allerton Conference on Communication, Control, and Computing. Monticello, IL, Oct. 2015
- *Financial storage rights*. Industrial and Systems Engineering Seminar, Lehigh University. Bethlehem, PA, Jan. 2015
- *Financial storage rights*. UC Berkeley. Berkeley, CA, Nov. 2014
- *Financial rights for energy storage*. INFORMS Annual Meeting. San Francisco, CA, Nov. 2014
- *Decentralized control of DC-segmented power systems*. 52nd Annual Allerton Conference on Communication, Control, and Computing. Monticello, IL, Oct. 2014
- *Financial storage rights*. Purdue University. West Lafayette, IN, Sept. 2014
- *Load-based power system regulation: algorithms and incentives*. Center for Nonlinear Studies, Los Alamos National Lab. Los Alamos, NM, Apr. 2014
- *Load-based power system regulation: algorithms and incentives*. Informal Systems Seminar, McGill University. Montreal, Quebec, Mar. 2014
- *Leveraging aggregations of flexible loads*. Pillai Institute of Information Technology, Engineering, Media Studies & Research. Navi Mumbai, India, Dec. 2013
- *Load-based power system regulation: algorithms and incentives*. Electric Energy Systems Group, Electrical and Computer Engineering, Carnegie Mellon University. Pittsburgh, PA, Oct. 2013
- *Learning algorithms for demand response*. UC Berkeley. Berkeley, CA, Oct. 2013
- *Restless Bandit Index Policies for Demand Response*. INFORMS Annual Meeting. Minneapolis, MN, Oct. 2013
- *Load-based power system regulation: algorithms and incentives*. Information, Systems, and Networks Seminar, Electrical Engineering Department, Cornell University. Ithaca, NY, Sept. 2013
- *Load-based power system regulation: algorithms and incentives*. Mechanical Engineering Department, Columbia University. New York, NY, Sept. 2013

## Service

### Editorial roles

- *IEEE Canada Conference Editorial Board*. 2016-2018
- *Journal of Modern Power Systems and Clean Energy*. Associate Editor for Special Issue on Ultra-high Levels of Variable Renewable Energy. 2017

## Session organizer

- *IEEE Conference on Control Technology and Application*. Control applications for renewable integration. 2017
- *INFORMS Annual Meeting*. Optimization in converter-based power systems. 2016

## Technical program committee

- *IEEE Electric Power and Energy Conference (EPEC)*. 2017
- *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*. Symposium on Signal and Information Processing for Smart Grid Infrastructures. 2016
- *Workshop on System and Control Perspectives for Smart City*. 2015
- *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*. Symposium on Signal and Information Processing for Optimizing Future Energy Systems. 2015
- *IEEE International Conference on Smart Grid Communications (SmartGridComm)*. Architectures, Control and Operation for Smart Grids and Microgrids Symposium. 2015
- *CIGRÉ Canada Conference on Power Systems*. Trends in Power System Planning and Operating for Evolving Grid. 2014
- *IEEE International Conference on Smart Grid Communications (SmartGridComm)*. Architectures, Control, and Operation for Smart Grids, Microgrids and Distributed Resources Symposium. 2014
- *IEEE International Conference on Smart Grid Communications (SmartGridComm)*. Symposium on Demand Side Management, Demand Response, and Dynamic Pricing. 2013

## Community engagement

- Speaker, *Financial Transmission and Storage Rights*, IEEE Smart Grid Webinar. April, 2017
- Panelist, *The Future of Energy Symposium*, Oakville Chamber of Commerce. June, 2015

## Reviewer

IEEE Transactions on {Automatic Control, Control of Network Systems, Energy Conversion, Power Electronics, Power Systems, Smart Grid}; IEEE Journal on Selected Areas in Communications; IET Generation, Transmission & Distribution; International Journal of Electrical Power & Energy Systems; Energy Economics; NSF, NSERC, CHIST-ERA