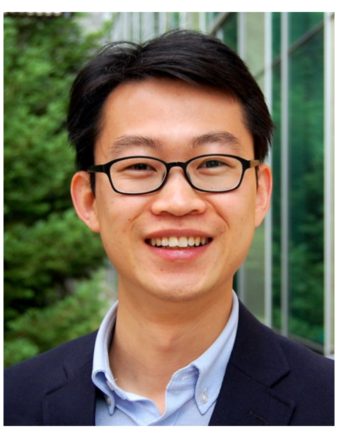
Presenter: Yu Zhang, Assistant Professor, Department of Electrical and Computer Engineering, University of California, Santa Cruz

Title: Efficient Power System State Estimation via Conic Relaxations: Algorithms and Performance

Abstract: This talk deals with the non-convex power flow and power system state estimation problems, which play a central role in dynamic monitoring and operation of electric power networks. The objective of the power flow problem is to obtain the state of the system from a set of noiseless measurements, whereas the state estimation problem deals with noisy measurements. The semidefinite programming (SDP) and second-order cone programming (SOCP) relaxations are then leveraged to cope with the inherent non-convexity of the power flow problem. It is shown that both conic relaxations recover the true PF solution under mild conditions. By capitalizing on this result, a penalized convex problem is designed for the state estimation. This penalized SDP problem is obtained from the aforementioned SDP relaxation, by adding a weighted least absolute value penalty for fitting noisy measurements. Strong theoretical results are derived to quantify the optimal solution of the penalized SDP, which is shown to possess a dominant rank-one component formed by lifting the true voltage vector. Numerical results on benchmark systems will be demonstrated to corroborate the merits of the proposed convexification framework.

Biosketch

Yu Zhang is an Assistant Professor in the ECE Department of UC Santa Cruz (UCSC). Prior to joining UCSC, he was a postdoc at UC Berkeley and Lawrence Berkeley National Laboratory. Dr. Zhang received his Ph.D. degree in Electrical Engineering from the University of Minnesota in 2015. His research interests span the broad areas of cyber-physical systems, big data analytics, signal processing, optimization and learning.



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