



Power Systems Engineering Research Center

Real-time Synchrophasor Analytics: Data Quality Monitoring and Anomaly Detection

Le Xie

Department of Electrical and Computer Engineering
Texas A&M University
le.xie@tamu.edu

PSERC Public Webinar

March 7, 2017

2:00-3:00 p.m. Eastern Time (11:00-12:00 p.m. Pacific)

Description: With the recent impetus towards design and adoption of synchrophasors in the power industry, there is an urgent need to develop online analytics based on synchrophasors. In the first part of the talk, a real-time data-driven approach is presented for monitoring and mitigating potential data quality issues. Based on the synchrophasor data's spatio-temporal correlations, the proposed approach is capable of identifying bad data during both *normal* and *fault-on* conditions. In the second part of the talk, we explore the dimensionality reduction of real-world synchrophasor data. The underlying low dimensionality is leveraged for online early anomaly (e.g., subsynchronous oscillations) detection and mitigation. Theoretical justification for the algorithm is provided using linear dynamical system theory. Numerical simulations using both synthetic and realistic PMU data are presented to validate the proposed algorithm.

Biography: Le Xie is an Associate Professor in the Department of Electrical and Computer Engineering at Texas A&M University. He received a B.E. in Electrical Engineering from Tsinghua University in 2004, S.M. in Engineering Sciences from Harvard in 2005, and Ph.D. in Electrical and Computer Engineering from Carnegie Mellon in 2009. His industry experience includes ISO-New England and Edison Mission Energy Marketing and Trading. His research interest includes modeling and control in data-rich large-scale systems, grid integration of clean energy resources, and electricity markets. Dr. Xie received the U.S. National Science Foundation *CAREER Award*, and Oak Ridge Ralph E. Powe Junior Faculty Enhancement Award. He was recipient of Texas A&M Dean of Engineering Excellence Award, ECE Outstanding Professor Award, and TEES Select Young Fellow. He is an Editor of *IEEE Transactions on Smart Grid*, and the founding chair of IEEE Power and Energy Society Subcommittee on Big Data & Analytics for Grid Operations. He and his students received the Best Paper awards at North American Power Symposium and IEEE SmartGridComm. He is the founding faculty advisor of TAMU Energy Club.