TEXAS A&M UNIVERSITY
Department of Electrical & Computer Engineering

TRANSFORMING ENGINEERING EDUCATION

ENERGY & POWER GROUP SEMINAR

Distributed Optimal Control of Grid-Forming and Grid-Following Inverters for Power System Frequency Regulation

Abstract

With the increasing penetration of power inverter-interfaced renewable generation, power systems face significant challenges in maintaining power balance and the nominal frequency. We study the grid-level coordinated control of a mix of grid-forming (GFM) and grid-following (GFL) inverters for power system frequency control. In particular, a fully distributed optimal frequency control algorithm is proposed based on the projected primal-dual gradient algorithm and the physical system dynamics structure. This algorithm 1) is implemented in a distributed fashion that only needs local measurement and local communication, 2) can minimize the total control cost and restores the nominal frequency, and 3) respects the power capacity limits and the thermal constraints of transmission lines. We also prove the global asymptotical convergence of this algorithm. Lastly, the effectiveness, optimality, and robustness of the proposed algorithm are demonstrated via numerical simulations.

Xiaoyang Wang
Ph.D. Student
Electrical & Computer Engineering
Texas A&M University

Friday, November 1
11:30 am
241 ZACH

Biography

Xiaoyang Wang is a first year PhD student in Electrical Engineering at Texas A&M University under the supervision of Dr. Xin Chen in Smart Power, Energy and Decision-making (SPEED) Lab. He holds the Master's and Bachelor's degree in Electrical Engineering from Xi'an Jiaotong University(XJTU). His research interests focus on high-renewable-penetration system planning, operation, and control. In particular, the focus is on the modeling, parameter identification, and control of inverter-based resource (IBR)-rich power systems. He was awarded the 2024-2025 Department of Electrical and Computer Engineering Graduate Merit Fellowship.

FACULTY CONTACT:
Xin Chen
xin_chen@tamu.edu