



# 學術報告

## Connecting Distributed Optimization and Distributed Control in Smart Grids and Green Buildings



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**Biography:** Xuan Zhang received the B.Eng. degree in Automation from Tsinghua University, Beijing, China, in 2011, and the Ph.D. degree in Control Engineering from the University of Oxford, Oxford, UK, in 2015. He is now a Post Doctoral Fellow in both the School of Engineering and Applied Sciences, and Harvard Center for Green Buildings and Cities, at Harvard University, Cambridge, MA, USA. His research interests include the control and optimization for smart power grids and green buildings, network congestion control, consensus of multi-agent systems, and the stability and robustness analysis of nonlinear dynamical systems.

In recent years, advanced communication, computing, sensing, and actuation technologies have been stimulating the emergence of cyber-physical systems. However, as the uncertainties fluctuate faster and by a larger amount, time-scale separation framework tends to induce a large economic loss and cause instability. In this talk, we will bridge the gap between distributed optimization and distributed control in two typical cyber-physical systems, focusing on frequency control in smart grids and Heating Ventilation and Air Conditioning (HVAC) system control in green buildings. We redesign the conventional frequency control by breaking time-scale separations and considering load-side demand response. We present an aggregation and disaggregation framework for real-time management of a population of building HVAC systems. This framework indeed serves as a load-side demand response scheme for grid frequency control.