

Title: Cost Effective Distributed Secondary Frequency Control via Consensus + Innovations

Duration: 2013 - 2015

Sponsor: Scott Institute, PITA

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Description:

Distributed generation resources have become significantly more prevalent in the electric power system over the past few years. This warrants a reconsideration on how the coordination of generation resources is achieved. This project particularly focuses on secondary frequency control. To provide an alternative to the centralized automatic generation control framework, we introduce a fully distributed real time control framework based on a consensus-plus-innovations approach. Such distributed control has provable performances: robustness guarantee and cost effectiveness, which make our approach highly desirable. Specifically, this approach chooses the most cost effective real-time deployment of the secondary frequency resources through consensus and local innovations. In the meanwhile, it performs  $\epsilon$ -close to the centralized optimal economic dispatch, where  $\epsilon$  is a positive constant depending only on the cost parameters and the communication topology.