

*Holcombe Department of Electrical and Computer Engineering
Seminar Series*

**An Integrated Framework to Address Power System Computational
Challenges**

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Abstract

In recent years, in order to handle increased level of uncertainty facing the industry that resulted from renewable energy development, demand side participation, policy landscape changes and so on, the power industry has frequently resorted to analyses that are highly computational intensive. The scope of such analyses often has to be cut back due to the limitation of analysis tools and extended simulation time. The highly intensive computation is especially needed for regions where power systems are operated by independent system operators (ISOs) and regional transmission organizations (RTOs) which serve two-thirds of the U.S. electricity customers through organized competitive wholesale electricity markets. In each of these markets, there are typically hundreds of market participants making distinctive business decisions to maximize their profits. This distributed decision making structure led to greater uncertainties and subsequently much increased computational needs for both ISOs/RTOs in effectively operating the system and market participants themselves in formulating business strategies. Furthermore, ISOs/RTOs often operate a combined footprint of many utilities and a very large power system involving thousands of generating units and transmission facilities, and therefore it poses great computational challenges to ISOs/RTOs in system operation and planning. The traditional analytical and computational methods as well as the tools built upon them are facing enormous difficulty in meeting the ever growing computational demand of modern power systems applications. This presentation will discuss a framework that aims to tackle the computational challenges in power system operation and planning from an integrated viewpoint examining fundamental theory, analytical methods and computing platform. Potential applications enabled by this framework will also be discussed.

Biography of Speaker

Dr. Rui Bo received the B.E. and M.E. degrees in electric power engineering from Southeast University (China) in 2000 and 2003, respectively, and received the Ph.D. degree at The University of Tennessee, Knoxville (UTK) in 2009. He worked at ZTE Corporation and Shenzhen Cermate Technologies Inc. respectively as software engineer and architect from 2003 to 2005. He has been employed at Mid-continent Independent Transmission System Operator (MISO) since 2009, where he is presently a principal engineer and project manager.

Dr. Bo is a senior member of IEEE. His research interests include advanced power system analysis and computational methods, renewable energy integration, and electricity markets and energy policies. He has authored and co-authored over 60 technical papers in peer reviewed journals and international conferences. He has served as an editor for international journals including IEEE Transactions on Sustainable Energy, and served as vice president of North America Chinese Power Professional Association. He is the recipient of MISO Outstanding Achievement Award, and 2012 IEEE Twin Cities Section Outstanding Engineer Award.