

LIDS Special Seminar Series: Future Challenges in Energy Systems and Networks

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Improving Economic Dispatch through Transmission Switching: New Opportunities for a Smart Grid

Friday, April 3, 2009

32-124 * 4:00-5:00 p.m. with discussion to follow

There will be a short reception at 3:30 p.m.
on the 6th floor of the Dreyfoos Tower

Abstract:

Traditional security constrained economic dispatch of electricity resources treats the transmission network as a fixed static topology while optimizing deployment of generation assets. However, it is well known that the redundancy build into the grid in order to handle the multitude of contingencies over a long planning horizon can in the short run create congestion and necessitate costly out of merit dispatch. While it is quite common for operators to occasionally open lines that reach their thermal limit, such practices are employed on an ad hoc basis and are not driven by cost considerations. The objective of our work is to explore, from an economic perspective, the potential of treating the grid as a flexible topology that can be co-optimized along with generation dispatch, subject to reliability constraints, so as to minimize the cost of serving load. We also explore the market implications of such co-optimization by the system operator.

This talk will review recent work by the authors demonstrating that optimizing the network topology with generation unit commitment and dispatch can significantly improve the economic operations while maintaining the traditional "N-1 reliability" standard. Our analysis also provides an assessment of potential economic gains from smart grid technologies that will enable of the N-1 reliability standard in favor of new reliability concepts such as "just in time N-1 reliability". Test results based on a DC OPF analysis are presented for the IEEE 118 bus model, the IEEE RTS 96 system and the ISO-NE 5000 bus electric grid.

Biography:

Shmuel S. Oren is the Earl J. Isaac Chair Professor in the Science and Analysis of Decision Making in the Industrial Engineering and Operations Research department at the University of California, Berkeley. He is the Berkeley site director of PSERC – a multi-university Power System Engineering Research Center sponsored by the National Science Foundation and industry members. His academic research focuses on planning and scheduling of power systems and on various aspects of electricity market design and regulation. He has been a consultant to various private and government organizations in the US and abroad and is currently a Senior Adviser to the Market Oversight Division of the Public Utility Commission of Texas (PUCT), and a consultant to the Energy Division of the California Public Utility Commission (CPUC). He holds B.Sc. and M.Sc. degrees in Mechanical Engineering from the Technion in Israel and also M.S. and Ph.D. degrees in Engineering Economic Systems in 1972 from Stanford University. He is a Fellow of the IEEE and of INFORMS.