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Distributed Real-Time Pricing in Multi-period Electricity Market

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Date: January 26, 2016 at 3:30pm
Location: ECAD 150 (Clark Conference Room)

Abstract:

This talk deals with a distributed optimal power supply-demand management method based on dynamic pricing in the deregulated electricity market. Since power consumers and generators determine their own power demand or supply selfishly in the deregulated electricity market trading, some distributed power management methods are required to maintain the power supply-demand balance in a power grid. For this problem, the proposed method integrates two different time periods deregulated electricity market, "Day-ahead market" and "Real-time market", and solves this management problem in a distributed manner using electricity prices through market trading. Specifically, the proposed method, first, derives the optimal locational electricity prices which maximize social welfare of the entire power network in the day-ahead market based on alternating decision makings of market players. Then, the proposed method compensates the power imbalance caused by some problems such as prediction errors via negawatt trading in the real- time market, in which power consumers reduce their demand, while they receive monetary incentives from the market operator. The proposed method shows the optimal incentive design method using the day-ahead prices to minimize the power adjustment cost in real-time market trading. Finally, numerical simulation results are shown to demonstrate the effectiveness of the proposed method.

Bio:

Toru Namerikawa received the B.E., M.E and Ph. D of Engineering degrees in Electrical and Computer Engineering from Kanazawa University, Japan, in 1991, 1993 and 1997, respectively. He is currently a Professor at Department of System Design Engineering, Keio University, Yokohama, Japan. He held visiting positions at Swiss Federal Institute of Technology in Zurich in 1998, University of California, Santa Barbara in 2001, University of Stuttgart in 2008 and Lund University in 2010. His main research interests are robust control, distributed and cooperative control and their application to mechatronic systems and power network systems.

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