POLYTECHNIQUE MONTRÉAL

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Seminar NSERC-Hydro Québec-Schneider Electric Industrial Research Chair on Optimization for Smart Grids

Revenue and Network-Constrained Day-Ahead Market Clearing under Marginal Pricing

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Abstract: In this seminar a practical day-ahead auction model, where generation revenue constraints are explicitly incorporated in the problem formulation, will be presented. The revenue-constrained market-clearing procedure includes the effect of the transmission network, inter-temporal constraints associated with generation scheduling, demand-side bidding, and marginal pricing. This auction design is an instance of price-based market clearing which features two major complicating factors. First, locational marginal prices become decision variables of the optimization process. In addition, producer revenues are formulated as bilinear and nonconvex products of power outputs and market-clearing prices. The resulting problem is formulated as a mixed-integer nonlinear bilevel program with bilinear terms for which available solution techniques rely on heuristics, approximations, or modeling simplifications. This work shows a novel and exact methodology whereby the original problem is recast as an equivalent single-level mixed-integer linear program. As a consequence, finite convergence to optimality is guaranteed and the use of standard commercial software is allowed. The proposed transformation is based on duality theory of linear programming, Karush-Kuhn-Tucker optimality conditions, and integer algebra results.

Bio: Natalia Alguacil received the Ph.D. degree in power systems operations and planning from the Universidad de Castilla-La Mancha, Ciudad Real, Spain, in 2001. She is currently an Associate Professor of electrical engineering at the Universidad de Castilla-La Mancha. Her research interests include operation, planning, and economics of power systems, as well as optimization. She is in her sabbatical leave from January to June 2018 in McGill University.

Thursday 12 April 2018, Pavillon André-Aisenstadt, Université de Montréal, room 4488.
15h30-15h45 **Come meet the speaker and other researchers over drinks and snacks**
15h45-17h00 **Presentation**

All are welcome • Contact: osg@polymtl.ca • Optimization for Smart Grids: http://osg.polymtl.ca