

Energy and Power Group

WEEKLY SEMINAR SERIES – SPRING 2019

Friday, April 19th, 2019, 9:10 a.m. – 10:10 a.m., ETB 1020

Managing Uncertainty in Electric Power Systems using Chance Constrained Optimization and Statistical Learning



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Abstract

Over the past decades, electric power systems have experienced major changes driven by the liberalization of energy markets and the rise of renewable energy. While market liberalization increases focus on optimal utilization of generation and transmission assets, the variability of renewable energy generation leads to higher uncertainty in system operation. Put together, the electric grid today presents a fascinating, real-life challenge for risk modelling and stochastic optimization. In this talk, I will first discuss the optimal power flow (OPF) problem and our work on developing chance-constrained OPF formulations that are tractable for large-scale instances. To achieve tractability, our chance-constrained OPF formulations restrict the real-time control actions to affine control policies. Motivated by the wish to discover more optimal control policies, we investigated the use of machine learning to efficiently obtain optimal solutions directly from the input parameters. However, existing learning methods often perform poorly in settings with hard feasibility constraints, which are important for secure power system operation. This prompted us to develop a new approach based on the discovery of active sets, which I will present in the second part of the talk.

Biography

Line Roald received her BSc and MSc in Mechanical Engineering (2012) and PhD in Electrical Engineering (2016) from ETH Zurich in Zurich, Switzerland. She was a post-doctoral researcher in the Advanced Network Science Initiative at Los Alamos National Laboratory in Los Alamos, New Mexico, USA, and joined University of Wisconsin - Madison as an assistant professor in August 2018. Her research focuses on modelling and optimization of energy systems under uncertainty.