



Dr. Yiling Zhang

Department of Industrial and systems engineering

University of Minnesota

Date: Friday, Feb 26, 2019

Time: 1 - 1:50 pm

Zoom Meeting ID: 970 7656 5407

Password: 477211

Distributionally Robust Chance-Constrained Building Load Control under Uncertain Renewables

Abstract: Aggregation of heating, ventilation, and air conditioning (HVAC) loads can provide reserves to absorb volatile renewable energy, especially solar photovoltaic (PV) generation. However, the time-varying PV generation is not perfectly known when the system operator decides the HVAC control schedules. To consider the unknown uncertain PV generation, in this paper, we formulate a distributionally robust chance-constrained (DRCC) building load control problem under two typical ambiguity sets: moment-based and Wasserstein ambiguity sets. We derive mixed-integer linear programming (MILP) reformulations for DRCC problems under both sets. Especially for the DRCC problem under the Wasserstein ambiguity set, we utilize the right-hand side (RHS) uncertainty to derive a more compact MILP reformulation than the commonly known big-M MILP reformulations. All the results also apply to general individual chance constraints with RHS uncertainty. Furthermore, we propose an adjustable chance-constrained formulation to achieve a reasonable trade-off between operational risk and costs. We derive tractable reformulations/algorithm under both ambiguity sets. Using real-world data, we conduct computational studies to demonstrate the effectiveness of the solution approaches and the efficiency of the solutions.

Biography: Yiling Zhang is an Assistant Professor in the Department of Industrial and Systems Engineering at the University of Minnesota. She received her Ph.D. in Industrial and Operations Engineering from the University of Michigan. Her research interests include stochastic programming, integer programming, nonlinear programming, optimization techniques, and statistical analysis. Her research has applications to various complex service systems, including shared mobility, power systems, and scheduling. Her research has been published in journals such as *Operations Research*, *Manufacturing and Service Operations Management*, and *SIAM Journal on Optimization*. Her work has been recognized by several awards, including Honorable Mention for INFORMS Optimization Society Student Paper Prize, IISE Pritsker Doctoral Dissertation Award (2nd Place), the Richard & Eleanor Towner Prize for Distinguished Academic Achievement, and the Murty Prize for Best Student Paper in Optimization.