

Distributionally robust optimization applied to distribution network operations under stochastic disruptions

Abstract: Incorporation of contingency in addition to generation/demand uncertainty can significantly improve the reliability and efficiency of a distribution power network. In this talk, we consider the multi-time period optimal power flow problem in distribution networks subject to stochastic N-1 contingency/disruption in a distribution line or a distributed energy resource. Furthermore, we model a period-to-period uncertainty for supply and demand under a distributionally robust framework. We formulate a multi-stage stochastic program and develop a cutting-plane algorithm for the distribution network OPF problem under stochastic N-1 disruptions. We include modeling features like linearized AC power flow physics, convexification of switching decisions, and battery efficiency curves.