

Alireza Soroudi, Abbas Rabiee and Andrew Keane, 2017, Information gap decision theory approach to deal with wind power uncertainty in unit commitment, *Electric Power Systems Research*, 145: 137-148.

Abstract

The renewable energy sources (RES) integration in the electricity supply utilities can reduce the energy procurement costs as well as the environmental concerns. Wind power is the most popular form of RES which is vastly utilized worldwide. This paper proposes a robust model for unit commitment (UC) problem, minimizing the operating costs considering uncertainty of wind power generation. In order to handle the uncertainties arising from volatile nature of wind power, information gap decision theory (IGDT) is utilized, where risk averse (RA) and opportunity seeker (OS) strategies are developed. RA strategy gives a robust decision making tool for handling the severe uncertainty of wind power, whereas the OS strategy makes benefit of possible uncertainties by adjusting the decision variables in a right way. Besides, the impact of demand flexibility (or demand response) on the operation costs is also investigated. The proposed model is examined on the IEEE 118-bus test system, and its benefits over the existing stochastic programming technique is examined. The obtained results demonstrate the applicability of the proposed method to deal with the UC problem with uncertain wind power generation. It is also observed that demand flexibility has positive impacts in both RA and OS strategies.

Author keywords

Demand response (DR), Information gap decision theory (IGDT), Uncertainty, Unit commitment (UC), Wind power