Mojtaba Mohseni, Ali Sedaghatkerdar, Mahdi Mohseni, Ehsan Heydarian-Forushani, Sitki Guner, Aydogan Ozdemir, 2022, Bidding strategy of a microgrid in joint energy and reserve markets: An IGDT-based approach, August 2022, 57th International Universities Power Engineering Conference (UPEC)

DOI: 10.1109/UPEC55022.2022.9917702

Abstract The increasing penetration rate of distributed energy resources (DERs) influences the operation process of power systems and also results in lots of challenges. One of the major challenges is to scheduling of such sources, and one of the most applicable approaches is to operate them in the form of micro-grids (MGs). Thus, the decision-making framework of the power systems' operation problems, in the emergence of MGs, has encountered a decentralized form instead of centralized one. Based on this change, the operation problem as well as the bidding strategy of the MGs participating in joint energy and reserve markets need new optimization approaches. Moreover, the control of uncertain parameters in the decisionmaking of MG operators (MGOs) should be molded through new mathematical Techniques. In this paper, the model of a grid-connected MG's operation problem is proposed so that the MGO implements the demand response programs (DRPs), and deals with the uncertainties of the reserve deployment probability and the renewable energy sources (RESs). To achieve this aim, an information gap decision theory (IGDT)-based approach is applied with the purpose of controlling the risk-based decision-making of the MGO. Lastly, the validation of the model is investigated by employing it on a test modified 15-bus MG and the results reveal the difference between the decisions of the risk-averse and risk-taker MGO.

Keywords Bidding strategy; Distributed energy resources; Energy and reserve markets; Information gap decision theory; Microgrid; Uncertainties.