

Hamid Reza Nikzad, Hamdi Abdi, Shahriar Abbasi, Robust unit commitment applying information gap decision theory and taguchi orthogonal array technique, chapter 7 in Behnam Mohammadi-ivatloo and Morteza Nazari-Heris, eds., 2019, *Robust Optimal Planning and Operation of Electrical Energy Systems*, Springer. DOI:

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Abstract The purpose of this chapter is investigating the unit commitment problem (UCP) in the presence of renewable energy sources (RESs), energy storage systems (ESSs), and modeling the uncertainties arising in this regard. To achieve this goal, the following subjects are presented in detail. The classic UC formulations, the uncertainties impacts on this problem, and the new research efforts in this regard are addressed. Also, the existing optimization methods applied to solve the UCP such as robust optimization (RO), information gap decision theory (IGDT), and Taguchi orthogonal array technique (TOAT) as well as their advantages and drawbacks are described in the next section. Also, the application techniques for modeling the renewable energy sources and energy storage systems are detailed. Various models of UC problem such as thermal power plants and thermal power plants combined with RESs and ESSs considering the most important uncertainties in the inactive networks are presented. The proposed models have been tested on standard case of IEEE, 10 units, and the results are presented.