

This paper presents a comprehensive two-stage robust security-constrained unit commitment (SCUC) approach, which minimizes the operation cost of the base case while guaranteeing that the robust solution can be adaptively and securely adjusted in response to continuous load and wind uncertainty intervals as well as discrete N-K generation and transmission contingency security criteria. In addition, corrective capabilities of both non-quick-start and quick-start units are rigorously formulated. Specifically, unit commitment of quick-start units is adaptively adjusted in the recourse stage for satisfying security constraints under various uncertainties, which introduces mixed-integer recourse to the proposed two-stage robust SCUC model. The proposed model is solved by the combination of modified Benders decomposition (BD) method and column-and-constraint generation (C&CG) algorithm, which decompose the original problem into a master UC problem for the base case and security checking subproblems for uncertainties. Numerical case studies on the modified IEEE 118-bus system illustrate the effectiveness of the proposed robust SCUC approach. Although the modified BD does not provide the tightest lower bound and may not guarantee the global optimality, robustness performance tests indicate that a reasonable threshold on the violation of security checking subproblems would guarantee good enough solutions from engineering point of view.