

Robust optimal design of UFLS schemes in Island Power Systems

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Abstract-

Since settings of conventional underfrequency load shedding (UFLS) schemes cannot be adjusted in real-time, this paper proposes a novel robust optimal design method of the UFLS scheme for an island power system (IPS) that once fixed, gives an adequate performance in all possible operating conditions in the IPS. The core of the novel robust optimal design method is the implementation of a synthetic data generation algorithm that covers all the feasible generator operating points, which are further classified into a set of large number (but computationally manageable) representative generation dispatches using clustering techniques. A real-world Spanish island will be used to illustrate the method, where the UFLS robust design will be tested and compared with non-robust UFLS designs tuned using generation dispatches of an actual day of operation provided by both standard and frequency-constrained unit commitment algorithms. Results will show that the proposed robust design avoids frequency constraints violations in contingencies and obtains better frequency metrics.

Index Terms- Frequency stability; under-frequency load shedding; island power systems; unit commitment

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