

Unit commitment with analytical under-frequency load-shedding constraints for island power systems

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Abstract-

This paper presents a novel corrective frequency-constrained unit commitment (C-FCUC) for island power systems implementing analytical constraints on underfrequency load shedding (UFLS). Since UFLS is inevitable for sufficiently large disturbances, it can be argued that less spinning reserve could be held back since UFLS takes place nonetheless. Congruently, the reserve criterion should consider UFLS likely to occur under disturbances. The C-FCUC can be converted into a preventive frequency-constrained unitcommitment (P-FCUC) or a standard security-constrained unit commitment. Thus, the C-FCUC is a generalization. The proposed formulation is successfully applied to two representative Spanish island power systems of La Palma and La Gomera. Results confirm that the proposed model can reduce generation costs while reducing the expected amount of UFLS.

Index Terms- Island power system, frequency stability, unit commitment, under frequency load shedding

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