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Abstract:

Large-scale grid-tied photovoltaic (PV) stations are increasing rapidly. However, this large penetration of PV systems creates frequency fluctuation in the grid due to the intermittency of solar irradiance. Therefore, in this paper, a robust droop control mechanism of the battery energy storage system (BESS) is developed in order to damp the frequency fluctuation of the multi-machine grid system due to variable active power injected from the PV panel. The proposed droop control strategy incorporates frequency error signal and dead-band for effective minimization of frequency fluctuation. The BESS system is used to consume/inject an effective amount of active power based upon the frequency oscillation of the grid system. The simulation analysis is carried out using PSCAD/EMTDC software to prove the effectiveness of the proposed droop control-based BESS system. The simulation result implies that the proposed scheme can efficiently curtail the frequency oscillation.

Keywords: Battery energy storage system, Droop control, Frequency oscillation, Power system, PV System