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A control strategy for stabilization of microgrid system base on the new energy storage

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This paper proposes a design of robust intelligent control for stabilization of grid-connected microgrid (MG) system, consisting of photovoltaic (PV), wind power (WP), Lithium-ion super capacitor. The fast variations of wind speed during extreme wind gusts result in fluctuations in both generated power and the voltage of power systems connected to wind energy conversion system (WECS) and its electrical output is difficult to predict and subject to factors outside the control of the operating company, these result in power fluctuations in a MG. To stabilize power fluctuations, an intelligent controller was proposed that the developed control strategy for mitigating wind power generation transients using Lithium-ion supercapacitor energy storage with active and reactive power support. The WECS includes squirrel cage induction generator (SCIG) with shunt connected capacitor bank to improve the power factor .The Lithium-ion supercapacitor energy storage system consists of step down transformer, power conditioning unit, DC–DC chopper. Fuzzy logic controller (FLC) is used with the DC–DC chopper to control the power transfer between the grid and energy storage. The Lithium-ion super capacitor energy storage system, coupled in a wind turbine generator to smooth wind power, is studied by real-time HIL simulation. The prototype controller is embedded in one real-time simulator, while the rest of the system is implemented in another independent simulator. After the simlulation it is found that the designed control scheme enhances the stability.

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