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## **Coordinated Fuzzy-Based Low-Voltage Ride-Through Control for PMSG Wind Turbines and Energy Storage Systems**

In this project, to meet several objectives, such as smoothing wind power (WP) fluctuations, shaving peaks, enabling power scheduling, allowing low-voltage ride-through (LVRT), Coordinated control methods involving a wind turbine (WT) and an energy storage system (ESS) is proposed. LVRT requirement is defined by grid operators, and it should be satisfied whenever grid faults occur. Several methodologies have been proposed for the LVRT both with or without the use of an ESS. Furthermore, using an ESS is more advantageous for several WP applications. By using an ESS, WTs can be operated in a more economic and reliable way. However, the installation cost of an ESS is high and it has operation range constraints for charging and discharging. Moreover, the WT operation condition and ESS state-of-charge (SoC) can be different when a grid fault occurs. Therefore, it is necessary to coordinate both units, WT and ESS, for reliable and economic operation during a grid fault. Thus, we propose a coordinated fuzzy-based LVRT method that considers the different operation conditions of a WT and an ESS. From the proposed method, the effective reference powers of a WT and an ESS are evaluated by considering the rotor speed and SoC in the fuzzy control algorithm. The effectiveness of the proposed method is validated by considering two case studies on ESS SoC and WT rotor speed violations.

**Domain:** Power Systems \_ Wind Power Generation

**Technology:** Electrical