ME24_06 – Frequency Regulation Coordinated Framework: Hybrid Battery Energy Storage System and Supercapacitor

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Abstract - Integrating renewable energy (RE) resources introduces several challenges to the conventional network, one of which is the degraded system inertial response. Frequency regulation (FR) works on stabilizing the system frequency by reducing the mismatch between generation and demand. Apart from conventional FR methods, storage systems can be utilized for such a purpose.
A hybrid storage system supported by a wind power source comprising a battery energy storage system (BESS) and a supercapacitor (SC) is considered in this study. The hybrid system aims to balance the given network's real frequency data. The corresponding capacity of both the BESS and the SC are optimized using nonlinear programming along with the set of constraints. The power density and energy density characteristics of both storage units are optimized in terms of their capacities.