ContainerPower Energy Solutions

Grid-side energy storage secondary frequency regulation

Overview

In view of the frequency fluctuation of the new power system caused by large-scale new energy grid connection, a secondary frequency modulation control strategy for grid-side energy storage devices is proposed, which takes the grid frequency modulation demand and batteries'frequency modulation capability into account.Can hybrid energy storage systems be integrated into secondary frequency regulation?

Particular emphasis is placed on incorporating hybrid energy storage systems (HESS) into secondary frequency regulation. The objective function for the intraday process, represented by Eq. (31), includes minimizing overall costs, maintaining the frequency at its nominal value, and minimizing deviations in the forecasting schedule cost (32).

What is a secondary frequency modulation control switch?

Comparison of output power with and without virtual impedance control When the load disturbance is large and the frequency change is more than 0.1 Hz, the secondary frequency modulation control switch is closed to participate in frequency modulation. Initially, the system carries a load with an active power of 200 W.

How to mitigate communication delays in secondary frequency regulation?

To mitigate communication delays, an adaptive consensus event-triggered algorithm is utilized. Particular emphasis is placed on incorporating hybrid energy storage systems (HESS) into secondary frequency regulation.

What are secondary frequency regulation signals?

Secondary frequency regulation signals The agents aim to minimize estimated costs and optimize dispatch to align with real-time data deviations at each time step t, considering priorities and objectives within the constraints. Meanwhile, the DEs adjust their dispatch strategies to mitigate penalties arising from forecasted day-ahead discrepancies.

Why is frequency regulation important in microgrids?

Therefore, addressing uncertainties, power quality, frequency stability, and communication delays is essential to enhance the resilience of MGs. In the framework of microgrids (MGs), frequency regulation is essential for reliable and efficient operation, especially with the increasing integration of renewable energy sources.

Does grid stability improve response time?

Additionally, the study demonstrates a 14.85% increase in overall system performance and a 20% decrease in response time to system disturbances. The proposed approach emphasizes improved grid stability and resilience amid uncertainties.

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