

## ESS Control Strategy for Primary Frequency Response in Microgrid Considering Ramp Rate

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**Abstract :** The application of ESS (Energy Storage Systems) in the future grids has been the solution of the microgrid. However, high investment costs necessitate accurate modeling and control strategy of ESS to justify its economic viability and further underutilization. Therefore, the reasonable control strategy for ESS which is subjected to generator and usage helps to curtail the cost of investment and operation costs. The rated frequency in power system is decreased when the load is increasing unexpectedly; hence the thermal power is operated at the capacity of only its 95% for the Governor Free (GF) to adjust the frequency as reserve (5%) in practice. The ESS can be utilized with governor at the same time for the frequency response due to characteristic of its fast response speed and moreover, the cost of ESS is declined rapidly to the reasonable price. This paper presents the ESS control strategy to extend usage of the ESS taken account into governor's ramp rate and reduce the governor's intervention as well. All results in this paper are simulated by MATLAB.

**Keywords :** micro grid, energy storage systems, ramp rate, control strategy

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