

# Coordination of distributed resources for frequency support provision in microgrids

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## Abstract-

To address the reduction of system inertia, Microgrids (MGs) and transient response specifications (frequency nadir and rate-of-change-of-frequency, ROCOF). The methodology has an iterative nature and can be applied when the network conditions change. In each iteration, the control parameters are adjusted based on the sensitivity of the system eigenvalues against the frequency metrics of interest while stability and operational constraints are respected. Compared to the literature, the use of quantitative parametric sensitivity is performed for the reallocation of several eigenvalues using two sensitivity components, not only one. Moreover, it is suitable for any combination of grid-forming and grid-following devices. The proposed methodology is applied to a benchmark MG and results show that both nadir and ROCOF can be effectively modified and set as required. The methodology was validated by using a real MG comprising four 15 kW converters and one 75 kW converter.

**Index Terms-** Microgrid; Inertia; Grid-forming; Nadir; ROCOF; Small-signal analysis

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