A Communication-less Solution for Transient Frequency Drift Compensation on Weak Microgrids using a D-Statcom with an Energy Storage System

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***Abstract*—This paper proposes a solution for the transient grid frequency drift that occurs when active power transients take place in weak grids. Microgrids (MGs) are by definition weak grids, exhibiting a low inertia and high impedance which make them prone to contingencies that compromise the grid quality and stability. Particularly, the low inertia of the generators coupled to a MG could make the rotor speed to be affected by load changes, thus affecting the grid frequency. When compared with previous works, this research proposes a method for the estimation of the steady state reference frequency and the use of a Luenberger type observer for the estimation of the load current, leading to an improvement in the dynamics and the mitigation of the compensator phase lag due to the grid frequency estimator. Different control strategies are compared during the analytical discussion and validated through experimental results.**

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