عنوان مقاله:

Multi-Objective Optimization Approaches for Hysteresis Inverters Based Active Power Filter Design

محل انتشار:

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خلاصه مقاله:

This paper presents an innovative active power filter design method to compensate simultaneously the current harmonics and reactive power of a nonlinear load. The power filter integrates a passive power filter, which is an RL low-pass filter placed in series with the load, and an active power filter, which comprises of an RL in series with an IGBT based voltage source converter. The filter is supposed to inject a current into the connection node of the load and grid to eliminate current harmonics and its reactive part. The voltage source converter is placed in a hysteresis feedback control loop to generate a harmonic current. The bandwidth and output amplitude of the hysteresis controller are optimized with the inductance of RL filters. Three objective functions are considered in the optimization problem, which include minimizing current total harmonic distortion, maximizing power factor, and minimizing the IGBT bridge current. For solving the optimization problem, three well-known multi-objective evolutionary algorithms are applied, namely, non-dominated sorting genetic algorithm-II (NSGA-II), Strength Pareto Evolutionary Algorithm 2 (SPEA2) and multi-objective particle swarm optimization (MOPSO). The test results showed that the MOPSO technique exhibited the better performance against NSGA-II and SPEA2 relative to the objectives.

کلمات کلیدی:

power filter; multi-objective optimization; NSGA-II; SPEA2; MOPSO; harmonic filtering; power factor correction

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