

عنوان مقاله:

Multi-Objective Optimization Based Approaches for Hybrid Power Filter Design

محل انتشار:

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خلاصه مقاله:

This paper introduces an optimal hybrid power filter design method to compensate simultaneously current harmonics and reactive power of a nonlinear load. The hybrid power filter consists of a passive RL low-pass filter placed in series with the load and an active filter which has RL elements connected in series with insulated gate bipolar transistors (IGBT) based voltage source converter. The filter is supposed to inject a current into the connection node of the load and grid in order to eliminate current harmonics and its imaginary current. The voltage source converter is placed in a hysteresis feedback control loop to generate the reference current. The band width and output amplitude of the hysteresis controller are optimized with inductance of RL filters. In solving the optimization problem, three objective functions are considered which include minimizing current total harmonic distortion (THD), maximizing power factor and minimizing the IGBT bridge current. The two optimization methods applied are non-dominated sorting genetic algorithm-II (NSGA-II) and strength Pareto evolutionary algorithm2 (SPEA2) methods. The results of the two optimization methods are compared and it is shown that the SPEA2 method gives the best performance in terms of minimizing current THD, maximizing the power factor and reducing IGBT bridge current.

کلمات کلیدی:

Hybrid Power Filter, Multi-Objective Optimization, NSGA-II, SPEA2, Harmonic Filtering, Power Factor Correction

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