

Control algorithms of shunt active power filter for harmonics mitigation: a review

ABSTRACT

Current harmonics is one of the most significant power quality issues which has attracted tremendous research interest. Shunt active power filter (SAPF) is the best solution to minimize harmonic contamination, but its effectiveness is strictly dependent on how quickly and accurately its control algorithms can perform. This manuscript reviews various types of existing control algorithms which have been employed for controlling operation of SAPF. Harmonic extraction, DC-link capacitor voltage regulation, current control and synchronizer algorithms are examined and discussed. The most relevant techniques which have been applied for each control algorithm are described and contrasted in an organized manner to identify their respective strengths and weaknesses. It is found that the applied control algorithms differ in two conditions: (1) the condition where harmonic current distortion is treated by the SAPF in the presence of non-ideal source voltage; and (2) the condition where multilevel inverter is employed as the circuit topology of SAPF.

Keyword: Active filter; Control technique; Current harmonics mitigation; Voltage-source inverter; Distorted source voltage; Power quality; Reactive power compensation