

Comparative study between fuzzy logic and artificial neural network (ANN) algorithms for single phase shunt active power filters (SAPFs)

Abstract

The excessive use of power electronics devices in industrial, commercial and residential purposes have lead to the deterioration of supply current and voltage wave forms, injecting harmonic pollution on to the supply system, which no doubt generates a major concern to power system engineers. Restricted standards set by IEEE-519 or IEC-61000-3-2 necessitates that, those unwanted harmonic injected current (into the utility networks) to fall below a specified range. Present day technological development, particularly in the field of power converters, introduces the application of active power filters as a modern weapon for harmonic current mitigation and reactive power compensation leading us to IEEE norms realization. This paper depicts comprehensively, comparison in terms of total harmonic distortion (THD) and simulation results, the most effectively fast response in harmonic mitigation between fuzzy logic based active power filter (APF) control and its artificial neural network (ANN) controller counterpart. In both cases, results were developed via simulation studies under MATLAB/SIMULINK environment.

Keyword: Shunt active power filter; Harmonics; Total harmonic distortion; Artificial neural network; Fuzzy logic controller; Power factor