Adaptive unified neural network for dynamic power quality compensation

ABSTRACT

Voltage sag is a temporary voltage drop at the fundamental component of utility voltage line. Because of its nature, fast detecting and compensating of sag is very critical. In this work, adaptive neural network is proposed for detection and compensating of sag conditions. The neural network part uses Adaline structure to model the fundamental component of line voltage. Moreover, an adaptive learning rule is applied on the neural network algorithm to enhance the system speed in detecting voltage sag magnitude and phase. For compensating the fault, another controller plant is implemented that uses Levenberg-Marquardt backpropagation algorithm. This plant is trained during normal condition of voltage line and memorizes its peak magnitude. While voltage sag happens, it compares difference between the magnitudes of the normal condition to the sag situation and generates proper switching signal for the compensator. The proposed compensator in this work is series active power filter which has ability to compensate power system harmonics at the same time.