

SINGLE-PHASE ACTIVE POWER FILTER FOR BATTERY CHARGER HARMONIC COMPENSATIONS

M.E. Mahadan, W.M.Utomo
Faculty of Electrical & Electronic Engineering,
Universiti Tun Hussein Onn Malaysia, Johor, Malaysia
awan1986@gmail.com

Abstract

This paper presents the employment of a single-phase active power filter to compensate harmonics generated by battery charger. The presence of the harmonics leads to various problems and poor power quality. The objectives of this project are to control and regulate the DC bus voltage of the single-phase active power filter and to obtain the switching signal for active power filter to generate appropriate current compensations. The operation of active power filter is verified using the simulations in Matlab/Simulink. PI controller is used in order to regulate the DC bus voltage and hysteresis current controller is employed to generate signal for switching purpose. The process is based on sensing line currents, filter currents and DC side capacitor voltage. The error signal caused by the filter has been computed firstly. Then this error signal has been compensated using the PI controller. The reference filter currents signal then obtained by subtracts the line current with the compensated signal from the controller. This reference current is feed to the hysteresis current controller and compare with the sensed filter currents to obtain the switching signal for active power filter. Simulation results are obtained with the active power filter and without the active power filter in the system. The system line currents with active power filter has a total harmonic distortion of 1.43% while the system line currents without active power filter has a total harmonic distortion of 36.36%. Thus, based on the simulation results this paper verified the ability of active power filter to compensate harmonics generated by the battery charger.