

Abstract

Power Quality is one of the topics which over recent years has drawn attention from all the sectors including academicians and industry personnel. This is due to the economic impacts concerning manufacturers, suppliers and equipment. Advancement in power flow control has led to the introduction of power electronic based equipment which draws non-linear current. This current distorts the mains voltage at PCC. This polluted supply voltage results in poor operating condition of equipment connected at the PCC. This is due to the drawing of this supply current by non-linear loads which contains harmonics.

This thesis discusses the application of Shunt Active Power Filter (SAPF) to minimize the harmonics to a great extent. This SAPF will inject the compensatory currents at the PCC. This will lead to the improvement in power quality by maintaining harmonics free voltage at PCC.

Two reference current extraction techniques are discussed in this thesis. These are:

1. The instantaneous active and reactive current I_d - I_q method.
2. The instantaneous active and reactive power P-Q method.

The first method was applied to the various converter loads. These loads connected were either fixed or variable in nature. And the second technique was applied to the BLDC load of 20kW. Various control techniques like voltage regulation of DC-Link Capacitor and Hysteresis Controller subjected to the generation of gating signals were discussed. MATLAB Simulink was used to carry out the simulations and obtain the results. The performance metric THD was obtained for each and every load to get an insight of performance of each control strategy.