

Active filter using Instantaneous P-Q Theory

Abstract

Power quality problem is the most sensitive problem in a power system. Most of the pollution issues created in power system is because of the nonlinear nature of loads. Due to large amount of non-linear equipment, impact and fluctuating loads (such as locomotive, arc-furnace, heavy merchant mill, welding equipment etc.), problems of power quality is becoming more and more serious problem with time. To overcome this problem APF (Active power filter) has gained more attention because of its excellent performance of harmonic mitigation and reactive power compensation. But still performance of the active filter depends upon different control strategies. This paper presents detailed analysis to compare and elevate the performance of two control strategies for extracting reference currents of shunt active power filter under balanced and un-balanced voltage condition by using PI controller. The instantaneous active and reactive current component (id-iq) method and instantaneous active and reactive power (p-q) method are two control strategies which are extensively used in active filters. A shunt active filter based on the instantaneous active and reactive current component (id- iq) method is proposed. This method aims to compensate harmonic and first harmonic unbalance. Both methods are completely frequency independent. Simulations are carried out with PI controller for the (Id-Iq) control strategies for different voltage condition. Under un-balanced voltage condition it is found that the instantaneous active and reactive current component (id-iq) has a better harmonic compensation performance.