

Power Quality And Electromagnetic Compatibility -The 'Simple Or Not So Simple' Ubiquitous Power Supply Input Stage -

Abstract

Power Quality is per se the ac line input voltage quality that in turn is determined by the interaction of the source impedance and the line current. Low frequency line current harmonics up to the 40th harmonic (2 kHz for 50 Hz systems) and high frequency conducted emissions in the range 150 kHz to 30 MHz are the two categories normally considered for EM compliance. This paper considers the low frequency line current harmonic compliance with EN61000-3-2 for currents up to 16 A per phase. The evolution of electronics into every day products means that the probability of EMI generated problems is ever increasing and requires Electrical and Electronic Engineers to consider EMC as an integral part of circuit and system design, and not as an add-on when the system fails compliance testing. To satisfy the need for an increasing number of engineers with an understanding of EMC, and undergraduate programme time constraints, the EMC and Compliance Engineering final year course in the Industrial Electronics Programme at Universiti Malaysia Perlis (UniMAP) uses Mathcad® as a computer aided 'Learning Enabler' that speeds up the learning process for the student without removing the need to understand what is happening. The ubiquitous (found everywhere) power supply input stage, the chosen application to demonstrate the approach, may at first glance appear to be a trivial application as it so often referred to as a 'simple' circuit; however the paper will demonstrate that line current harmonic analysis is not so simple when circuit parasitic effects are considered relating line current harmonics to the regulatory limits is also complex when transitory and partial odd harmonic limits are involved.

Author Keywords

Design: EMC; Mathcad®; Power Electronics