POWER FACTOR COMPENSATION USING BOOST RECTIFIER

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CHAPTER 1

INTRODUCTION

1.1   Introduction

Most people in the power engineering field have encountered the question about which direction the harmonic power is flowing, from the source to the load or, from the load to the source. While this is still a controversial topic for some people, the most commonly accepted practice for determining this is to look at the harmonic watts phase angle, or the relationship between the voltage and current for a particular harmonic. The presence of harmonics can distorted the supply waveforms and cause problems in respect to firing circuits which rely on the supply voltage zero as reference to the delay firing angle [1].

1.2   Harmonic History

The problem of power systems harmonics is not a new phenomenon by any means. It is as old as the power network itself, with the first studies on the subject traced back to the 1890s, when transformers and rotating machinery were identified as the main source of waveform harmonic distortion [1]. It is reported that in 1893, Charles Proteus Steinmetz arrived in Lynn, Massachusetts, to work for Thomson-Houston. One of his early assignments was to solve a motor heating problem at Hartford, Connecticut. Steinmetz had the mathematical background to conduct harmonic analysis and made good use of it to identify and solve the problem, which was traced to the combined action of a resonance in the transmission circuit feeding the plant and a generator with a substantial amount of waveform distortion. To analyze this problem, he used a device called a wave-meter to construct electric waveforms and, not without a great amount of work, carried out Fourier analysis.

Reportedly, it took him about one hour to produce each coefficient of the Fourier series.

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