# Design of an Auxiliary Converter for the Diode Rectifier and the Analysis of the Circulating Current

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## Abstract

In this paper, an IGBT-based auxiliary converter (AXC) system is proposed. The AXC operates as a shunt active filter to compensate the harmonic current of the rectifier when the load consumes power. When the DC load re-generates, the AXC system can channel the re-generation energy back into the utility system. The combination of the diode rectifier and the AXC can accomplish unity power factor operation and re-generation, but it also causes circulating current between the AXC and the rectifier, which leads to higher operational losses and higher noise level. The mechanism of the circulating current is analyzed in this paper, and solutions are also presented. Computer simulation and field test results are presented to validate the performance of the proposed AXC system.

Keyword：shunt active filter, regeneration