

An Auxiliary Converter for a Diode Rectifier with Mitigated Circulating Current

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Abstract

The proposed auxiliary converter system operates as a shunt active filter that compensates for harmonic current of the diode rectifier, and provides re-generation capability. However, the combination of the auxiliary converter and diode rectifier causes circulating current, which results in increased operational losses and noise. Circulating current is a zero-sequence component resulting from the pulse width modulation (PWM) operation of the auxiliary converter system, and is independent of diode rectifier loading. The magnitude of circulating current is closely related to the inductance along circulating path, PWM switching frequency and the PWM modulation index. Adding inductors, increasing PWM frequency and space vector PWM scheme can effectively suppress the peak value of circulating current. Therefore, an auxiliary converter system with mitigated circulating current, which achieves the same functionality as an active front-end converter at a significantly lower cost and higher reliability, is proposed. Computer simulation and test results are utilized to verify the performance of the proposed auxiliary converter system

Keyword : space vector PWM