

Abstract

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New back-to-back current source converter with soft start-up and shutdown capabilities

Back-to-back voltage source and current source converters are key components of many power conversion systems. Various topologies have evolved around these conventional voltage and current source converters in an attempt to meet different design and reliability constraints. This paper proposes a new back-to-back current source converter that avoids the problem of excessive voltage stresses on the switching devices associated with the traditional current source converter. Its main features are reduced power circuit and control complexity, and sinusoidal ac currents with high power factor achieved at both ac sides at reduced switching frequency. Basic relationships that govern steady-state converter operation are established, and filter design is included. PSCAD/EMTDC simulations and experimentation are used to demonstrate the practicality of the proposed power conversion system, and results show that the converter has good dynamic performance, with near unity input power factor over an extended operating range.