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CHARACTERIZATION AND IMPLEMENTATION OF RESONANT ISOLATED DC/DC CONVERTERS FOR FUTURE MVDC RAILWAY ELECTRIFICATION SYSTEMS

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ABSTRACT

To improve their efficiency and increase railroad traffic, new dc electrification has recently been proposed at high power application. It is now necessary to prepare the migration of infrastructure and rolling stock, using power electronic transformers (PETs), for adaptation to this voltage level. For this application, high efficiency and reduced volume are essential. This article clearly demonstrates that it is now possible to achieve a compact, high-power, isolated dc–dc converter using MOSFET power modules with high efficiency. After a preliminary study based on simulations, this article focuses on the characterization and implementation of elementary isolated dc–dc converters the proposed topology is a series-resonant converter rated for a nominal power. First, laboratory testing using an "opposition method" is used to evaluate the elementary converters up to their nominal power using both electrical and thermal measurements to accurately determine losses and efficiency. At the nominal output power, an efficiency of 98.93% is obtained. In isolated bidirectional DC-DC converter, soft switching is provided for reduce the switching losses and stresses on switches.

KEYWORDS: *PETS, Isolated DC–DC Converters, Soft Switching*