

Line-current control with a series thyristor-controlled reactance based on a superconducting coil for electric-energy systems

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Abstract-

This paper describes the experimentes carried out with a series controlled reactance to be used for line-current control in an electric-power transmission line. The controlled reactance has been built with a superconducting coil that can be short-circuited by two inverse parallel thyristors. It is shown that, if the thyristors are fired at a variable angle every cycle, the effective series impedance of the device can be varied continuously as a function of the firing angle. A single-phase prototype has been built for closed-loop current control in an a.c. circuit. Conventional thyristors and firing circuits have been used for the prototype and no weitching-off control is necessary. The same technology is frequently used in electric energy systems. The controller has been fully implemented using a digital signal processor (DSP) and a commercial real-time interface. This gives good flexibility to the controller design and test. The paper investigates experimental results for the steady state and the transient performance of the prototype.

Index Terms- Current control, electric energy systems, superconducting coil, phase-angle control

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Citation:

García-Cerrada, A.; Mingorance, P.; Fernández, C.; Robertson, A.; García-Tabarés, L.; Grau, A.; González, V.; Rodríguez-García, J.M.; Alonso-Llorente, J.F. "Line-current control with a series thyristor-controlled reactance based on a superconducting coil for electric-energy systems", IEEE Transactions on Applied Superconductivity, vol.9, no.2, pp.330-333, June, 1999.