

Design Method of a Variable Inductor to be Used for a Rectifier at Railway Substations

Gaku MORITA Tomoyuki HIKOSAKA Hirokazu HAYASHIDA Masashi KATO

This paper describes a new voltage adjustment technique and its design method. A voltage compensator, which consists of a variable inductor and a control board, is connected between a transformer and a rectifier as a series compensator at the new technique. The voltage-drop induced by the variable inductor controls the DC output voltage of the rectifier. The control technique of the inductor is devised based on the core magnetic flux control technique which was originally developed by the Tohoku Electric Power Company. The authors developed a new structure of the variable inductor suitable for the railway application, with a focus on the six-phase AC and the large current capacity. A fast simulation method to be used for the designing of the inductor was developed based on the magnetic flux circuit theory and the non-linear simulation technique of ferromagnetic materials. A verification of the design and simulation method was carried out by comparing the measured and calculated data using a prototype variable inductor.