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Abstract

Simulation on I-V Feature of Protection System for Superconducting Cable

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The thesis reports a solution on monitoring the superconducting cable to prevent heating accidence during power transmission. From a microscopic level, the simulation is based on a modulated model of superconducting cable in study its operation behaviour by using the time-dependent Ginzburg-Landau (TDGL) equations in the non-equilibrium state. The simulations include the effects of applied magnetic field, vortex motion, material properties and thermal fluctuations for exploring the I-V characteristics of the cables. Voltage and current are calculated from the vortex speeds and the magnetic fields. As shown in the results, the vortex motion in superconducting devices is an important factor especially in large current such as for electric power transmission. Therefore, operation parameters of protection systems for designed superconducting power cables can be established on the simulation database to prevent cable from temperature increased to critical point.