Configuration Proposal of an On-vehicle Insulation Diagnostic Device for Superconducting Maglev Propulsion Coils Using Partial Discharge Detection

Satoru OTA Ryohei IKEDA Minoru NAKASHIMA

Ground coils are essential components of superconducting maglev systems. Propulsion coils, a category of ground coils, require rigorous insulation diagnostics to withstand mechanical, electrical, and environmental stresses, strong dynamic electromagnetic interactions, and high voltages. This paper reviews the requirements for insulation diagnostics of propulsion coils, emphasizing previously developed efficient methodologies. One such methodology is an advanced diagnostic system that analyzes electromagnetic waves from partial discharges to evaluate coil deterioration and identify discharge locations. Following the discussion, we propose a device design that enables real-time diagnostics to be carried out directly from the vehicle, enhancing operational efficiency and reducing the size of necessary installations.