Contribution ID: **714** Contribution code: **TUE-PO1-513-13** Type: **Poster**

Study on Low Loss Coil Structure for High Energy Density of a Wireless Power Transmission System Using High Temperature Superconducting Coils for Railway Vehicle

Tuesday, 16 November 2021 13:15 (20 minutes)

A Wireless Power Transmission (WPT) system for a railway vehicle has been investigating to reduce the greenhouse gas emissions in a diesel vehicle. Since the WPT system for the railway vehicle is required to transmit the electric power of several hundred kW in a short time, it is difficult to suppress heat generation by the internal resistance of a copper coil. Therefore, we have investigated the WPT system using a high-temperature superconducting (HTS) coil for the railway vehicle. On the other hand, in order to reduce the AC loss of the HTS coils in the conceptual design of the WPT system for the railway vehicle, and it was necessary to install multiple HTS coils in parallel on the vehicle and ground sides. Also, the increase in size of the HTS coils and cooling system was a problem, and it is necessary to increase the transmission power density per the HTS coil. Therefore, we focused on narrow REBCO wire arranged in parallel to achieve the low loss coil structure for high energy density. In this study, we measured the AC loss characteristics of the HTS coil using parallelized REBCO wires. Also, we clarify the low loss coil structure for high energy density, and evaluated the power transmission characteristics of the WPT system using the low loss HTS coil for the railway vehicle. As a results, the low loss coil structure for high energy density can be achieved by a single pancake coil structure with the parallelization of the narrow REBCO wire in the radial direction. We clarified the WPT system using the low loss HTS coil can perform more rapid charging and the high-efficiency transmission than that using the copper coils.

Primary author: Dr INOUE, Ryota (Okayama University)

Co-authors: UEDA, Hiroshi (Okayama University); KIM, SEOKBEOM (Okayama University)

Presenter: Dr INOUE, Ryota (Okayama University)

Session Classification: TUE-PO1-513 SMES, Transformers, Wireless Power Transfer