Contribution ID: **489** Type: **Poster Presentation of 1h45m**

3D Electromagnetic Design and Analysis of a 1-HP-Class HTS Rotating Machine integrated with a Contactless HTS Excitation Device

Monday, August 28, 2017 1:15 PM (1h 45m)

This paper presents electromagnetic design and 3D finite element analysis (FEA) results to develop prototype machine system for the high-temperature superconducting (HTS) rotating machine integrated with a contactless HTS excitation device (CHED). This is connected and integrated on the same shaft of the rotating machine and charge the HTS field coils by pumping magnetic flux with non-contact method. Therefore, this can be excellent alternative to replace a contact type conventional excitation device which has thermal and mechanical instability by physically connecting cryogenic temperature environment inside HTS rotor with room temperature environment outside HTS rotor. In this paper, 1-HP-class HTS rotating machine was basically designed by analytical method to build 3D FEA model and then, the initial design model was electromagnetically analyzed using commercial 3D FEA software. The basic magnetic field distribution information on HTS rotating machine with CHED was investigated and the various output performances of HTS rotating machine in steady state operation were analyzed. Especially, the real charging data achieved by preliminary experiment with HTS coil and CHED prototype was used in 3D FEA as a input boundary condition to simulate the electromagnetic characteristics in initial charging mode of 1-HP-class HTS rotating machine.
Acknowledgement: This work was supported in part by the Human Resources Program in Energy Technology of the Korea Institute of Energy Technology Evaluation and Planning (KETEP), grant funded by the Ministry of Trade, Industry & Energy, and by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIP), Republic of Korea. (Nos. 20164030201230 and 2016R1A2B4007324)

Submitters Country

Republic of korea

Primary authors: Mr KIM, Ji Hyung (Jeju National University); KIM, Ho Min (Jeju National University)

Co-authors: Mr HYEON, Chang Ju (Jeju National University); Mr QUACH, Huu Luong (Jeju National University); CHAE, Sang Heon (Jeju National University); KANG, Min Hyeok (Jeju National University); Prof. KIM, Eel-Hwan (Jeju National University); YOON, Yong Soo (SHIN ANSAN UNIVERSITY); Mr LEE, Jeyull (Yonsei University); Mr JEON, Haeryong (Yonsei University); Mr HAN, Seunghak (Yonsei University); Mr KIM, Young-Gyun (Korea University); LEE, Haigun (Korea University)

Presenter: Mr KIM, Ji Hyung (Jeju National University)

Session Classification: Mon-Af-Po1.04

Track Classification: E1 - Motors