MT 26
International Conference on Magnet Technology
Vancouver, Canada | 2019

Contribution ID: **1674** Type: **Poster Presentation**

Tue-Af-Po2.25-01 [112]: Structure Design and Performance Analysis of Superconducting DC Energy Transfer Line

Tuesday, 24 September 2019 14:00 (2 hours)

Transmission integration of power and the gas could be realized If a superconducting DC cable uses liquefied natural gas (liquefaction temperature: 110K) or liquid hydrogen (liquefaction temperature: 27K) as the cooling medium. Therefore, the efficiency and reliability of the liquefied natural gas (LNG) integrated energy transfer system can be improved using superconducting DC energy transfer line. This paper presents principles in designing the superconducting DC energy transfer line. The design scheme of superconducting DC energy transmission line is given. The structure of superconducting DC cable part is conductor on round core cable (CORC) wound by the second generation (2G) high-temperature Superconducting (HTS) tapes. The twist angle and relative position of different tape layers affect the distribution of transmission current, which further impacts the distribution of magnetic field. This paper uses finite element method to simulate such effect and the effect of external shielding layer on magnetic field distribution. Based on the simulation results, the superconducting cable is optimized with the aim of maximizing critical current. Considering the transmission principle of LNG, the theoretical efficiency, reliability and cost of the whole energy transfer system are calculated. And the optimal design of superconducting DC energy transfer line with the best comprehensive performance is given based on the calculations.

Primary author: Ms ZHANG, Yiqun (Tsinghua University)

Co-authors: Mr XUE, Peng (Tsinghua University); Prof. JIANG, Xiaohua (Tsinghua University); Mr ZHAO, Guangrui (Tsinghua University); Prof. YUGUANG, Sun (Tsinghua University)

Presenter: Mr XUE, Peng (Tsinghua University)

Session Classification: Tue-Af-Po2.25 - Novel and Other Applications III