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

Contribution ID: **1734** Type: **Contributed Oral Presentation**

Wed-Af-Or15-03: Conceptual design of an HTS motor for future electric propulsion aircrafts

Wednesday 25 September 2019 16:30 (15 minutes)

Electric propulsion systems are attracting much attention as a revolution in the aviation industry. The key components of this revolution are electric motors and generators. However, conventional machines are limited in their rated power, power density, and are not suitable for aircraft because of their size and weight. High-temperature superconducting (HTS) power machines have the advantages of high power density due to their high current density, high magnetic field density, and low losses, thus reducing the size and weight of the machine. This paper presents the conceptual design of an HTS motor for future electric propulsion aircrafts. A 5MW HTS motor uses superconducting wire for both DC excitation and AC winding coils. The operating temperature was estimated based on the observed magnetization curves and the Ic –B –T characteristics. Effective length, air-gap, magnetic load, power loss, and diameter of the motor were designed and analyzed through both analytical solutions and numerical simulations. As a result, the motor was able to achieve 97.5% efficiency at rated output conditions. The output density is about 15 kW/kg, 1.5 times higher than that of the conventional motor. These results can be used effectively to design HTS motors for future electric propulsion aircraft.

Author: Mr LE, Dinh-Vuong (Changwon National University)

Co-authors: Prof. YU, In-Keun (Changwon National University); PARK, Minwon (Changwon National University); Dr LEE, Seok-Ju (Changwon National University)

Presenter: Mr LE, Dinh-Vuong (Changwon National University)

Session Classification: Wed-Af-Or15 - Rotating Machines I