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

Contribution ID: **622** Type: **Poster Presentation**

Tue-Af-Po2.25-09 [119]: A Novel Magnetic Gear with Unequal Halbach Array and Spoke Permanent Magnets

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

Due to low acoustic noise, low vibrations, reduced maintenance and inherent overload protection, magnetic gear (MG) has been extensively used in many industrial applications for transmitting torques and adjusting speeds. However, the biggest shortcoming of MGs is their poor torque densities. Although several attempts have been conducted for improving their torque density, such as optimizing the design parameters and adopting bulk high temperature superconductors (HTS) to provide stronger magnetic field, they are still far away from satisfying the demands of industrial applications. In order to improve the torque density of MG, this paper proposes a novel MG with unequal Halbach Arrays on the inner rotor and spoke permanent magnets on the outer rotor. On the inner rotor, a new arrangement of Halbach array which is "unequal"on magnetization direction and arc length of each segment is proposed. Both fundamental flux density and total harmonic distortion (THD) of "unequal"Halbach array is better than the "equal"one. On the outer rotor, the permanent magnets are spoke structure and tangential magnetization direction, and a larger per-pole flux density can be obtained in the air gap. The two-dimensional finite element method is used for simulating the proposed model. The magnetic field and electromagnetic torque of the magnetic gear are calculated. Compared with the conventional magnetic gear, the results show that the torque transmission capability of the proposed magnetic gear can be substantially improved by about twice time.

Primary authors: Dr JING, Libing (China Three Gorges University); Mr HUANG, Zhangxian (China Three Gorges University); WANG, Qian (Huazhong University of Science and Technology); Prof. QU, Ronghai (Huazhong University of Science and Technology); HUANG, Hailin (Huazhong University of Science and Technology)

Presenter: WANG, Qian (Huazhong University of Science and Technology)

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