MT25 Conference 2017 - Timetable, Abstracts, Orals and Posters



Contribution ID: 133

Type: Poster Presentation of 1h45m

Analytical approach to maximize the torque density with size constraints for PMSM

Thursday 31 August 2017 13:45 (1h 45m)

IPMSM is mainly used as the traction motor of HEV and EV, because it has the high torque density and the wide operating range. Especially the size limit of traction motor exists in HEV, because HEV system consist of the engine and the electric propulsion systems at limited space. Many studies have been conducted to maximize the torque of a single air gap IPMSM with the size constraints. In some studies, there are ways to maximize the air-gap flux density by changing the shape and arrangement of the permanent magnet of the rotor with the fixed stator outer diameter, stack length and rotor outer diameter. In some studies, there are ways to add to the cooling structure in order to improve the current density of stator. As a result, the improvements of air-gap flux density by magnet and current density improve the torque density of IPMSM. In this paper, the single air-gap IPMSM was validated by experiments after design for 120kW class traction motor of military trucks with water cooling in order to improve the torque density. In the process of designing, the ratio of stator and rotor that generates maximum torque in given size constraints exists regardless of the shape and arrangement of the permanent magnet. The analytical approach to calculate its ratio was proposed in this paper. And the analytical approach was validated by FEA.

Acknowledgements: This work was supported by the Energy Efficiency & Resources of the Korea Institute of Energy Technology Evaluation and Planning (KETEP) grant funded by the Korea government Ministry of Trade, Industry & Energy (No. 201520201065200)

Submitters Country

Republic of Korea

Author: LEE, KIDOEK (Korea Electronics Technology Institute)

Co-authors: Dr RHYU, SEHYUN (Korea Electronics Technology Institute); Dr LEE, JEONGJONG (Korea Electronics Technology Institute)

Presenter: LEE, KIDOEK (Korea Electronics Technology Institute)

Session Classification: Thu-Af-Po4.05

Track Classification: E1 - Motors