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

Contribution ID: **1708** Type: **Poster Presentation**

Mon-Mo-Po1.06-02 [64]: Study on Performance and Irreversible Demagnetization according to rotor-teeth of SPMSM

Monday 23 September 2019 09:15 (2 hours)

In case of Surface-mounted Permanent Magnet Synchronous Motor(SPMSM), PMs are attached to the surface of laminated core. They are connected by adhesion and magnetic force. However, in order to withstand rotation of the motor, thousands of revolutions per minute, rotor-teeth between PMs are essential to hold them strongly in position.
The rotor-teeth are also ferromagnetic material, they would be additional paths of magnetic flux in q-axis. These paths affect to flow of magnetic flux around airgap, and it could bring about leakage. Output performance get worse in this process, but also it reduces a risk of irreversible demagnetization on edge of PMs. Because load, magnetic field intensity, on PM decreases. And thicker rotor-teeth grip PMs stably more. So, it could be shown as trade-off relation. There are many variables which have influence on this phenomenon as motor composition like number of poles and slots, PM shape, airgap length, magnetic flux density, current and so on. Especially, thickness of rotor-teeth is one of them as well.
In this paper, relations between variables and effects are determined by means of analytical method. Considering variables mentioned, magnetic equivalent circuit could be offered. Both analytical method and numerical method based on a finite element analysis(FEA) are used with respect to several SPMSM models, in order to estimate that the proposed method is valid or not. Then the finding data by proposed method are compared with them of numerical method and verify that the technique is reasonable. So, we can predict the various characteristics analytically fast including performance variation and irreversible demagnetization prevention function. Also, mises stress and displacement ratio are interpreted in accordance with stability of PMs. Finally, a proper way to design optimized rotor-teeth depending of types of motor is suggested.

Authors: Mr KANG, Seung-Gu (SungKyunKwan University); Prof. JUNG, Sang-Yong (Department of Electronic and Computer Engineering, Sungkyunkwan University)

Co-authors: KANG, Dohyun (Sungkyunkwan University); Mr LEE, SungChang (SungKyunKwan University)

Presenter: Mr KANG, Seung-Gu (SungKyunKwan University)

Session Classification: Mon-Mo-Po1.06 - Motors I