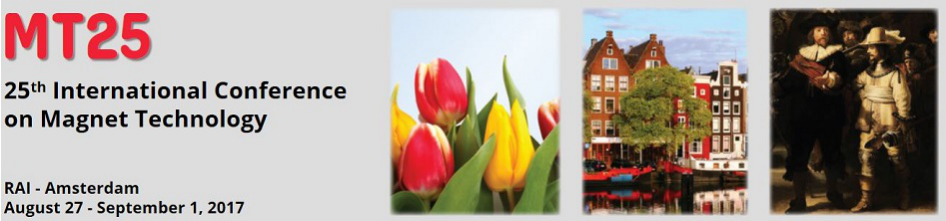

Contribution ID: **996** Type: **Poster Presentation of 1h45m**

Influence of Stator Structure on the Static Characteristics in Axial Field Flux Switching Permanent Magnet Machine

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

Axial field flux-switching permanent magnet machine (AFFSPMM) has the advantages of inherent sinusoidal back-EMF waveform, high power density, and large torque capability, which is suitable to use in electric vehicle. The investigated AFFSPM machine is composed of two outer stators and one inner rotor both with a doubly-salient structure. The stator contains 12 modular U-shaped laminated segments, PMs, concentrated armature coils and field windings. A concentrated armature coil is wound around the two adjacent stator teeth with a piece of PM in the middle. The PMs are magnetized circumferentially and the magnetization is reverse in polarity from one magnet to the next. There is neither PMs nor coils in the rotor. In order to reduce the usage of permanent magnet and improve the static characteristics of AFFSPMM, three different stator structures, including parallel stator tooth and parallel slot (PST-PS), parallel stator tooth and parallel permanent magnet (PST-PPM), parallel permanent magnet and parallel slot (PPM-PS), are investigated. Based on 3-D finite element, the static characteristics, such as the flux-linkage, back-EMF, output torque, and cogging torque are analyzed. The influence of stator tooth width, permanent magnet width, stator yoke width, stator axial length, rotor shape angle, and rotor tooth width on the static characteristics of AFFSPMM with three different stator structures is investigated. The results show that increasing the rotor tooth width and the rotor shape angle can improve the characteristics of PPM-PS and PST-PS structure. For PPM-PST structure, stator structure has great influence on the characteristics. The PPM-PS structure can gain more sinusoidal back-EMF, larger output torque, and lower cogging torque than the other structures. The prototype with PPM-PS structure is made and the experiments are done.
This work is supported by the Natural Science Foundation of Jiangsu Province (BK20161425), and the National Natural Science Foundation of China (51277025 and 51577027).

Submitters Country

China

Primary author: HAO, Li

Co-authors: Mr LIN, mingyao (Southeast University); LI, nian (Southeast university); XU, Da

Presenter: HAO, Li

Session Classification: Thu-Af-Po4.05

Track Classification: E1 - Motors