MT25 Conference 2017 - Timetable, Abstracts, Orals and Posters



Contribution ID: 971

Type: Poster Presentation of 1h45m

A Multi-Tooth Axial Field Flux-Switching Hybrid Excitation Machine

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

Axial field flux-switching permanent magnet (AFFSPM) machine has the advantages of inherent sinusoidal back-EMF waveform, high power density, and large torque capability, which is suitable to use in electric vehicle (EV). However, the cogging torque of the AFFSPM machine is high and it is difficult to modify the flux, which limits the use in EV. In this paper, a novel multi-tooth axial field flux-switching hybrid excitation (AFFSHE) machine is proposed and investigated. The proposed multi-tooth AFFSHE machine is composed of two outer stators and one inner rotor both with a doubly-salient structure. The stator contains 6 modular multitooth 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 a magnetic bridge between the two adjacent stator teeth and the field windings are wound axially around the magnetic bridge. There is neither PMs nor coils on the rotor. The topology and the operation principle of the multi U-shaped stator tooth AFFSHE are analyzed. The power size equation is deduced and the size of the multi-tooth AFFSHE machine is suggested. Based on the 3-D finite element analysis, the electromagnetic performances of the multi-tooth AFFSHE machine, including the magnetic field distribution, flux-linkage, back-EMF, cogging torque, and output torque are investigated. The influence of the number of the stator tooth structure and the combination of the stator tooth number and the rotor pole number on the back-EMF and the cogging torque are investigated.

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

Authors: Dr HAO, Li (Southeast University); Prof. LIN, Mingyao (Southeast University); LI, nian (Southeast university); XU, Da

Presenter: Dr HAO, Li (Southeast University)

Session Classification: Thu-Af-Po4.05

Track Classification: E1 - Motors