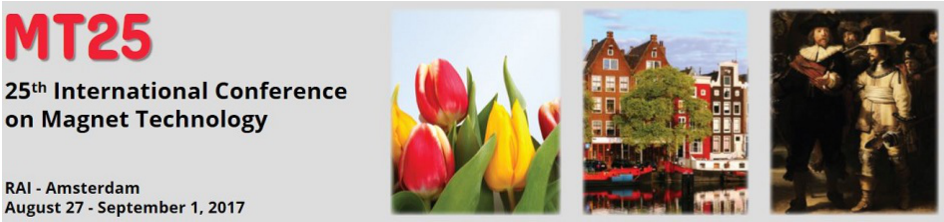

Contribution ID: **784** Type: **Poster Presentation of 1h45m**

Design and Analysis of A Novel Modular-Stator Tubular Vernier Permanent-Magnet Machine

Monday 28 August 2017 13:15 (1h 45m)

Currently, the tubular linear permanent-magnet machine has been increasingly adopted for active vehicle suspension, since it has zero net radial force between the armature and stator, no end-windings, and volumetrically efficient. However, it suffers from relatively low thrust force and poor fault-tolerant capability. Thus, a novel modular-stator tubular vernier permanent-magnet machine will be proposed in this paper, which not only improve the force performance, but also significantly enhance the fault-tolerant capability. Both magnets and armature windings are on the stator, while the mover is only consisting of iron with salient teeth which work as modulation teeth. Meanwhile, the modular complementary stator structure is designed to decoupling the adjacent phase windings, hence offering the desired fault-tolerant capability. Moreover, The PMs with two magnetized directions are adopted, namely radially and axially. One is used to produce the main flux, while another can reduce fringing leakage flux, hence increasing the thrust force capability. The electromagnetic performances of the proposed machine is analyzed by using the finite-element method. Thus, it can be known that the back electromotive force of the proposed machine is symmetrical and sinusoidal due to its complementary permanent magnet magnetic circuits. Moreover, the ratio of the mutual inductance to self-inductance of the proposed machine is only 0.90%, revealing that the proposed machine possesses the desired fault-tolerant capability. The average thrust is 720 N when the electric load is 183A/cm, while the thrust ripple of the proposed machine is 8%. Detailed results and discussions will be given in full paper.

Submitters Country

China

Primary authors: Ms YAO, Tian (School of Electrical and Information Engineering, Jiangsu University); Prof. ZHAO, Wenxiang (School of Electrical and Information Engineering, Jiangsu University); Ms BIAN, Fangfang (School of Electrical and Information Engineering, Jiangsu University); Mr CHEN, Liyang (School of Electrical and Information Engineering, Jiangsu University); Mr ZHU, Xuhui (School of Electrical and Information Engineering, Jiangsu University)

Presenter: Ms YAO, Tian (School of Electrical and Information Engineering, Jiangsu University)

Session Classification: Mon-Af-Po1.04

Track Classification: E1 - Motors