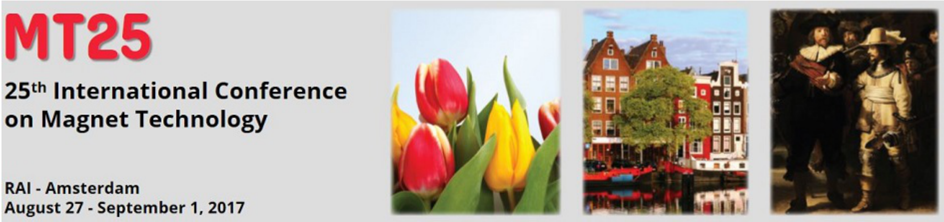

Contribution ID: **1124** Type: **Poster Presentation of 1h45m**

A Superconducting Linear Variable Reluctance Machine for Urban Transportation Systems

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

Electrification of urban transportation systems has been considered as the most promising solution for reducing the air pollution, the oil dependence and improving the energy efficiency. Therefore, it becomes more and more popular around the world. The fundamental components in these systems are electric motors which provide the propulsion force. Practically, the electric propulsion by linear motors is characterized by rapid acceleration / deceleration, negotiate steep gradients, immune to be bad weather and reduced maintenance cost. Thus, this technology attracts more and more attention recently. The purpose of this paper is to propose a new linear variable reluctance motor (LVRM) for the electric propulsion in urban transportation systems. The new LVRM will be equipped with both armature and field windings for a doubly excitation. Thus, the so-called excitation penalty existing in traditional VRMs can be alleviated. Furthermore, by introducing an additional superconducting DC field winding used for excitation, the air-gap flux can then be flexibly controlled hence extending the constant-power range, and improving efficiency. The stator (rail) is simply composed of iron core without windings nor PMs. This contributes to a very low inertia and low cost system, robustness and suitable for high speed operation. Since each phase of the proposed machine is magnetically decoupled from each other, it is easy to design a 5-phase machine based on the proposed machine topology. Within the mover (car), each phase is separated with a certain electrical degree. While inside the stator (rail), successive toothed-pole structure is adopted which is similar to other doubly-salient linear machines. The detailed design, analysis and verification will be presented in the full paper.
This work was supported by a grant (Project No. MYRG2015-00218-FST) from Research Council of the University of Macau, and a grant (Grant No. 51607114) from the National Natural Science Foundation of China, China.

Submitters Country

Hong Kong

Primary authors: Dr CHING, T.W. (University of Macau); Dr LI, Wenlong (The University of Hong Kong)

Presenter: Dr CHING, T.W. (University of Macau)

Session Classification: Mon-Af-Po1.05

Track Classification: E4 - Levitation and Magnetic Bearings