Contribution ID: **714** Type: **Poster Presentation of 1h45m**

Improved Inner Stator-Magnet Moving-Iron Transversal-Flux Linear Oscillatory Machine with Magnets in Inner Stator Yoke

Tuesday, 29 August 2017 13:15 (1h 45m)

Abstract- The stator-magnet moving-iron transversal-flux linear oscillatory machine (SMTLOM) offers the merits of high reliability and robustness, high material utilization ratio, low fabrication difficulty and cost and so on. However, due to its iron mover, the weight of moving structure is relatively higher than that of moving-magnet linear oscillatory machine (MLOM). Consequently, a rather rugged resonant spring is required to match the system resonant frequency, which would increase the fabrication and maintenance cost. Also, with the magnets and winding fixed on same stator, the temperature of magnets would rise easily. Therefore, in order to reduce the mover weight and prevent magnets away from winding (regarded as the main heat source), meanwhile still inherit the advantages of high reliability and robustness, low fabrication difficulty etc., from SMTLOM, one improved inner stator-magnet moving-iron transversal-flux linear oscillatory machine (ISMTLOM) is proposed, with magnets inserted in the inner stator core and the redesigned lighter iron mover placed in the dual air-gap between the inner and outer stators. In such structure, the weight of iron mover could be reduced by as lighter as magnets mover. Furthermore, with the magnets and winding placed on different stators, the heat is hard to conduct from outer stator to inner stator, thus the temperature of magnets would be lower. More detail of performance analysis and comprehensive comparison with conventional SMTLOM in key indexes such as size sensitivity, flux field distribution, static thrust, and temperature distribution etc., are going to be revealed in the upcoming full paper.

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Session Classification: Tue-Af-Po2.06

Track Classification: E1 - Motors