Analysis of the Force Ripples of a Current Loaded PMLSM

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Abstract

Purpose – The purpose of this paper is to present an analysis of the force ripples of an open slot permanent magnet linear synchronous motor (PMLSM). A calculation procedure using 2D finite elements method is then evaluated with experimentations.

Design/methodology/approach – First, the studied PMLSM and its main features are introduced. Then, we present the 2D-FEM model used to study the motor. The methods used to calculate the force and the meshing procedures are also highlighted. The calculated no-load force is compared to measurements. Lastly, the validated model is used to study the influence of the current magnitude on the force ripples at load.

Findings – In addition to the no-load case, the influence of the current magnitude on these forces is presented.

Originality/value – The paper is orientated with a sound industrial background. For that reason, the impact of the current saturation on the thrust generation is presented via the evolution of the thrust coefficient, which is the force to the RMS currents ratio.

Keywords force ripples, PMLSM, linear motor, finite element method, saturation

Paper type Research paper

References


