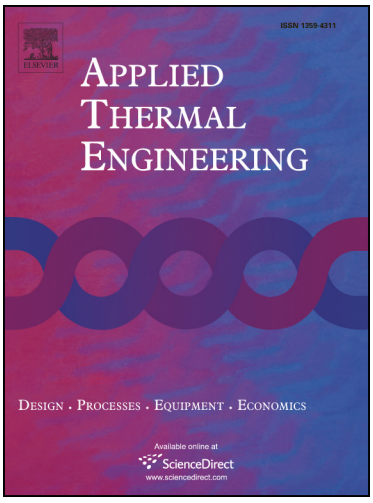

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Abstract: The temperature analysis of permanent magnet linear motor (PMLM) is related to their optimization design, which is important in improving a motor's efficiency and working capacity. However, a typical dilemma exists in computational accuracy, computing time and practicability of a 3-Dimentional (3-D) Electromagnetic-fluid-thermal (EM-FT) field. The purpose of this paper is to reduce the computing time of this coupled field on the premise of guaranteeing computational accuracy, thus improving its practicability. Through interpolation and fitting of a polynomial, the average wind velocities and heat transfer convection coefficients of different external surfaces of the PMLM are obtained, separating the fluid field from the coupled calculation. Based on the basic theory of electromagnetic calculation, hydromechanics, heat and mass transfer, a simplified 3-D flow model is built without considering the inner structure of the mover. Because of the nonlinear characteristics of the electromagnetic and fluid field, a 3-D electromagnetic-simplified fluid-thermal coupled model is built, and the coils steady-state temperature and distribution characteristics are stated. The results are verified by the experiment. The 3-D electromagnetic-simplified fluid-thermal coupled model makes it possible to predict the thermal performance for the PMLM rapidly and accurately.

Keywords: Calculation time, Fluid field, Heat convection coefficient, Electromagnetic-thermal field, Interpolation.