SPEED CONTROL OF LINEAR INDUCTION MOTOR USING SLIDING MODE CONTROLLER CONSIDERING END EFFECTS

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ABSTRACT

The movement of a linear induction motor (LIM) causes eddy currents circulate within the secondary conductor sheet at the entry and the exit of the first core known as 'end effects. The eddy currents tend to resist sudden flux variation, allowing only gradual change along the airgap. Hence, 'end effect' causes not only the losses but also airgap flux profile variation changes depending on the speed. Linear induction motor (LIM) is considered as a distinctive motor that has become the focus study area for researchers. However, it has its drawbacks, such as huge speed control challenge due to its high coupling, non-linear complexity and end effect. In this study, the Indirect Field-Oriented Control (IFOC) of LIM is proposed to solve the problems due to the end effects. The sliding mode control is implemented to achieve the speed and flux-tracking under load thrust force disturbance. The proposed design was simulated using MATLAB Simulink and the simulation results show that the proposed controller (with the compensation) has a very good dynamic performance than the conventional controller without the end effects compensation.

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