

Development of Industrial Servo Control System for Elevator-Door Mechanism Actuated by Direct-Drive Induction Machine

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Abstract: In this study, an industrial sliding-mode servo control system is developed for the motion control of a direct-drive-type elevator-door servomechanism. The mechanical structure and dynamic analyses of an elevator-door mechanism with an indirect field-oriented induction servomotor drive is described initially. Moreover, a newly designed total sliding-mode control (TSMC) system, which is insensitive to uncertainties in the whole control process, is introduced. In addition, numerical simulation and experimental results due to specific position and velocity profiles are provided to verify the effectiveness of the proposed control scheme with regard to parameter variations and external disturbance. Furthermore, the merits of the TSMC system are exhibited in comparison with computed torque control (CTC) and conventional sliding-mode control (CSMC). The salient features of this study are 1) the controlled system has a total sliding motion without a reaching phase and no chattering torque, and 2) this simple control strategy is easily implemented by hardware/software to an industrial servo controller.

Keywords: *Sliding-mode control; computed torque control; indirect field-oriented; induction servomotor drive; elevator door.*

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