Basic Research on Electromagnetic Edge Control for a Traveling Continuous Steel Plate (Application of Sliding Mode Control)

by

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Abstract

A continuous thin steel plate subjected to iron and steel processes is supported by a series of rollers during processes such as rolling; the thin steel plate moves on the rollers at a speed of 10 m/s or more. In the plating process, the steel plate is conveyed 20-50 m in the vertical direction for drying, during which the steel plates are negligibly supported by rollers and other mechanisms. Therefore, plating nonuniformity due to the generation of vibration and other reasons prevents the increase in productivity. In this study, a noncontact guide mechanism using an electromagnetic attractive force applied to the edge of the conveyed steel plate is proposed. The sliding mode control, which is one of the nonlinear robust controls, is applied. We experimentally examined the effect of the absolute spatial positioning of the edge by the active edge control of the conveyed steel plate, and the suppression effect of elastic vibration in the continuous steel plate.

Keywords: Steel Plate, Traveling, Electromagnet, Edge Control, Continuous Model, Sliding Mode Control

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