

Disturbance Cancellation Control of Electromagnetic Levitation System for Thin Steel Plate (Basic Research on Rigid Steel Plate)

by

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Abstract

In thin steel plates used in many industrial products, including those of the automobile industry, flaws on the plate surface and peeling during the surface treatment process are induced due to the use of many rollers in the conveyance process. These lead to the deterioration of the quality of the plate surface. Electromagnetic levitation techniques can solve many problems in the conveyance modes of sheet steel. We have proposed a magnetic levitation control system for maintaining the relative distance of the plate surface and the electromagnet, and carried out an experiment on digital control. In this study, the equipment was designed so that electromagnets, which are used for the magnetic levitation of a steel plate, vibrate vertically. For basic research, a controlled object was assumed to be a single-degree-of-freedom model and disturbance cancellation control was used as the control method. The vibration isolation effect observed in the steel plate was confirmed by experimentation and simulation.

Keywords: Steel Plate, Electromagnetic Levitation, Vibration Isolation, Rigid Body, Optimal Control, Disturbance Cancellation Control

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