

Sampled Weighted Attraction Control of Distributed Thermal Scan Welding.

Charalabos C. Doumanidis

Abstract: This article addresses the problem of distributed-parameter control for a class of infinite-dimensional manufacturing processes with scanned thermal actuation, such as scan welding. This new process is implemented on a robotic GTAW laboratory setup with infrared pyrometry, and simulated by a flexible numerical computation program. An analytical linearized model, based on convolution of Green's fields, is expressed in multivariable state-space form, with its time-variant parameters identified in-process. A robust controller design compensates for model uncertainty, and a sampled weighted attraction method is introduced for heat source guidance based on real-time thermal optimization of the heat input distribution. The distributed thermal regulation strategy with infrared feedback is validated both computationally and experimentally in scan welding tests.

Keywords:

AMS Subject Classification: