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Abstract

Dual-actuated Vibration Suppression Technology for a Rotary System's position on a Vibrating Frame: Disturbance Rejection and Active Damping

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Abstract:

A vibration suppression technology for position control of a rotary system powered by two permanent magnet DC (PMDC) motors, mounted on an vibrating frame, is proposed. To achieve vibration suppression in these systems, active damping and disturbance rejection (ADDR) technology is presented which introduces a cooperation of a main and an auxiliary actuator, controlled by discrete-time sliding mode control (DTSMC) based schemes. The controller of the main actuator tracks a desired position and the auxiliary actuator simultaneously isolates the induced vibration, as its controller follows a torque trend. To determine this torque trend a combination of two algorithms is introduced by the ADDR technology. The first torque-trend producing algorithm rejects the disturbance by counteracting an estimation of the perturbation, derived from a model-based observer. The second applies active variable damping to minimize the oscillation of the output shaft. In this practice, the

presented technology is implemented on a rotary system with a pendulum attached, mounted on a linear actuator simulating an oscillation-transmitting frame. In addition, the obtained results illustrate the functionality of the proposed technology.

Biography:

Kamand Bagherian received her B.Sc. degree from K. N. Toosi University of Technology, Tehran, Iran. Her reasearch interests include nonlinear control, state/parameter estimation, and mechatronics.

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