

## Optimal Closed-loop Input Shaping Control Scheme for a 3D Gantry Crane

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**Abstract :** Input shaping has been utilized for vibration reduction of many oscillatory systems. This paper presents an optimal closed-loop input shaping scheme for control of a three dimensional (3D) gantry crane system including. This includes a PID controller and Zero Vibration shaper which consider two control objectives concurrently. The control objectives are minimum sway of a payload and fast and accurate positioning of a trolley. A complete mathematical model of a lab-scaled 3D gantry crane is simulated in Simulink. Moreover, by utilizing PSO algorithm and a proposed scheme the controller is designed to cater both control objectives concurrently. Simulation studies on a 3D gantry crane show that the proposed optimal controller has an acceptable performance. The controller provides good position response with satisfactory payload sway in both rail and trolley responses.

**Keywords :** 3D gantry crane, input shaping, closed-loop control, optimal scheme, PID

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