

Vibration Control of a Three-Leg Optical Table by Mechatronic Inerter Networks

Yu-Chuan Chen, Sheng-Yao Wu and Fu-Cheng Wang*

Abstract

This paper develops a three-leg optical table, and applies a newly-developed mechatronic inerter network to suppress vibrations of the table. Optical tables can insulate precision machines from two types of disturbances: ground disturbances from the environment and load disturbances from the equipment. Using disturbance response decoupling (DRD) techniques, we can effectively isolate the ground disturbances by soft passive suspensions and improve the load responses by active control. This paper further applies mechatronic inerter networks to a three-leg optical table, and optimizes the ground responses by connecting the networks to suitable electric circuits. We then apply DRD techniques to improve the load responses without influencing the ground responses, and implement the optical table for experimental verification. Based on the results, the proposed mechatronic inerter networks and DRD structures are deemed effective in improving system responses.