

Vibration Control of an Optical Table by Mechatronic Inerter Networks

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Abstract

This paper applies a newly developed mechatronic inerter network to control the vibrations of an optical table. As technology is advanced, the requirements for vibration control are becoming increasingly stringent. Therefore, optical tables are normally applied to precision systems to suppress two main vibrations: load disturbances from the machine and ground disturbances from the environment. However, the suspension settings need to be *stiff* to isolate the load disturbances but *soft* to suppress the ground disturbances. Therefore, we apply disturbance response decoupling techniques for independent treatment of these two vibration sources. We combine a mechatronic inerter network with spring-damper sets to suppress ground disturbances in a passive way, and use piezoelectric transducers to actively improve load responses. Based on the simulation and experimental results, the design is deemed effective.