

## **Vibration control of an optical table employing mechatronic inerter networks**

Fu-Cheng Wang\* and Sheng-Yao Wu

### **Abstract**

This paper applies a newly developed mechatronic inerter network to suppress vibrations of a full optical table. Optical tables are normally applied to insulate precision machines from two types of disturbances: ground disturbances from the environment and load disturbances from the equipment. These two disturbances can be independently controlled by disturbance response decoupling (DRD) techniques. For example, we can isolate the ground disturbances by soft passive suspensions and improve the load responses by active control. However, the passive elements cannot be easily adjusted according to the operating conditions. Therefore, this paper applies mechatronic inerter networks to a full 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. The designed mechatronic inerter networks and active controllers are implemented to a full optical table for experimental verification. Based on the results, the proposed mechatronic inerter networks and DRD structures are deemed effective in improving system responses.