

A Passive Reaction Force Compensation for a Linear Motor Motion Stage Using Pre-Compressed Springs

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Abstract : Residual vibration of the system base due to a high-acceleration motion of a stage may reduce life and productivity of the manufacturing device. Although a passive RFC can reduce vibration of the system base, spring or dummy mass should be replaced to tune performance of the RFC. In this paper, we develop a novel concept of the passive RFC mechanism for a linear motor motion stage using pre-compressed springs. Dynamic characteristic of the passive RFC can be adjusted by pre-compression of the spring without exchanging the spring or dummy mass. First, we build a linear motor motion stage with pre-compressed springs. Then, the effect of the pre-compressed spring on the passive RFC is investigated by changing both pre-compressions and stiffness of springs. Finally, the effectiveness of the passive RFC using pre-compressed springs was verified with both simulations and experiments.

Keywords : linear motor motion stage, residual vibration, passive RFC, pre-compressed spring

Conference Title : ICVPME 2017 : International Conference on Vibration Problems and Mechanical Engineering

Conference Location : Tokyo, Japan

Conference Dates : May 28-29, 2017