

**Development of the Autonomous Negative Stiffness Damper
for Absolute Response Reduction**

Akihiro TOYOOKA Hiroki MOTOYAMA
Osamu KOUCHIYAMA Yuichi IWASAKI

In this paper, a new vibration control device realizing a negative stiffness in a passive manner is proposed in order to reduce both absolute acceleration and displacement of railway structures under strong motions. The developed device consists of a sliding plate and a PTFE portion, and they are vertically pressurized by coil springs. The shape of the slide plate is an inverted convex, by which the control force is negatively proportional to the deformation. The prototype of the proposed device was assembled, and its performance was investigated by both cyclic and hybrid loading tests. It was confirmed thorough a series of tests that the proposed device generated stable negative stiffness that reduced the maximum acceleration of the structure significantly without considerably increasing the absolute displacement.