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Characteristics of seesaw system for vibration control of structures

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For earthquake damage mitigation of structures, many types of vibration control systems have been developed. For example, structural vibration can be reduced by using energy dissipation devices such as steel dampers, in which the seismic energy is dissipated through yield deformation of steel. In an axial-yield type damper that uses buckling-restrained braces, the bracing members are repetitively subjected to compressive and tensile forces. Therefore, the buckling restraining members must have sufficiently large second moment of inertia for preventing buckling under compression. Recent studies proposed a new vibration control system for structures referred to as a seesaw system because one rotatable member in this system moves similarly to that of a seesaw. A couple of dampers are installed under the rotatable member. By introducing a quasi-linear motion mechanism in this system, only tensile force is generated in the bracing members, which enables the use of steel rods and cables as bracing members. This paper presents investigation on characteristics of the seesaw system for the application to the vibration control of steel structures. The benefits of using the seesaw system are discussed based on the previous research results, in which the U-shaped steel dampers, steel slit dampers, and friction dampers have been examined through cyclic loading tests, and the viscoelastic dampers and fluid viscous dampers have been examined through seismic response analysis of steel structures.

Biography

Hiroshi Tagawa is a Professor of the Graduate School of Engineering at Hiroshima University. He earned his Doctorate degree in Engineering from Kyoto University. During 2001–2012, he served as Associate Professor at Nagoya University. In 2012, he became a Professor at Hiroshima University. His research interests are in Structural Engineering for steel buildings.

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