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A study on restoring force characteristics and passive control design method of steel framed structures with scaling-frame

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The innovated vibration control device called as “Scaling Frame” (abbreviated as “SF”) structure is proposed by the author. SF structure consists of beam-column frame, diagonal bracing, and SF device (abbreviated as “SFD”) made of Aluminum or steel. And, vibration energy can be absorbed by plastic response behavior of diagonal deformation of SFD. In our previous studies, the experimental study on SFD and steel frame specimen with SFD installed was conducted to clarify the seismic response and seismic mitigation effect. Furthermore, SF structure has been already adopted for low-rise wooden buildings in Japan. In this study, SF structure is assumed to apply on multi-story steel frames, that is, in which high strength and rigidity are required. So then, a various types of SFD are developed to increase resistance performances. And also, to clarify its restoring force characteristics, the horizontal static cycle loading test is conducted. The test results indicate that SF structure presents the hardening characteristics during inelastic cyclic loading. And the analytical study is performed, it is confirmed that the proposed analysis model can chase test results well. Furthermore, the seismic design procedure is reformulated to adapt the restoring force characteristics of SF structures. From the analytical results, it is confirmed the design method shows enough accuracy and the number of damper can be decreased by use of new type of SFD. Moreover, decreasing the number of damper, the most effective parameter of some parameters such as reduction rate, width and thickness is analyzed.

Biography

Keita Saito is from Saitama prefecture, Japan. He received his degree from the Department of Architecture in Tokyo University of Science in 2017. He is now a Master's course student of Tokyo University of Science. His research interest includes vibration control structure called as Scaling-Frame structure proposed by the author, Donghang Wu.

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