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Improving brace member performance with steel hook dampers

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ABSTRACT

Steel braced frames are commonly used in earthquake-resistant designs due to their high strength and energy dissipation capabilities. However, the inevitable brace buckling at large deformation incurs high costs in after-shock rehabilitation. Therefore, a modification to further improve the performance of the brace design is essential. This study focused on the development and verification of an efficient brace design with pre-separated brace segments and a pair of steel hook dampers (SHDs), as shown in Fig. 1, that possessed uniform yielding mechanism when subject to axial load. A series of cyclic loading tests with various SHD dimensions were carried out to evaluate the performance of the proposed designs. It can be concluded from the test results that the proposed brace members exhibited significant deformation and energy dissipation capacities. Test result also showed that significant equivalent viscous damping, approximately 35% to 40%, were adequately achieved in the brace members. Simultaneous enhancement in equivalent viscous damping, strength and energy dissipation validated the applicability of the proposed method to the earthquake-resistant designs.

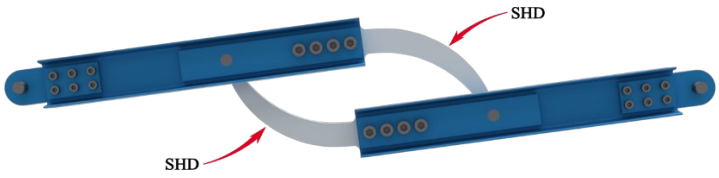

Fig. 1 Design concept of the proposed brace member

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