

RESEARCH PROGRESS ON SEISMIC PERFORMANCE OF STEEL FRAMES EQUIPPED WITH SMA-BASED SELF-CENTRING ENERGY DISSIPATION BAYS (SCEDBS)

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Abstract. *To enhance the seismic resilience of steel frame structures towards sustainable seismic engineering, the structural system of steel frame equipped with self-centring energy dissipation bays (SCEDB), which uses superelastic shape memory alloy (SMA) connections, is proposed. In particular, a SCEDB is developed by installing SMA-based energy dissipation connections in a pre-selected bay of a steel frame strategically. Under seismic events, the inelastic actions of the system would be locked in the SCEDB for a wide deformation range. Owing to the self-centring behaviour of the SMA-based connections in the SCEDB, the post-earthquake residual deformation of the frame would also be minimised. This conference paper reports the recent progress on the seismic behaviour of steel frames equipped with SMA-based SCEDBs. A feasibility study on novel SMA-based connections applicable to the SCEDB was carried out. Subsequently, the hysteretic behaviour of SMA-based connection was examined using a numerical study based on validated finite element (FE) models to demonstrate the potential of its application and the encouraging hysteretic responses with excellent self-centring behaviour was characterised. The preliminary results show that the connection could achieve desirable seismic performance with negligible post-earthquake residual deformation.*