

EFFECT OF CONCRETE SLAB AND CONNECTION ON PERFORMANCE OF BOLTED LINKS IN RE-CENTRING ECCENTRICALLY BRACED FRAMES

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This thesis investigates the performance of removable bolted links in re-centering eccentrically braced frames (EBFs), focusing on the influence of reinforced concrete (RC) slabs and various connection types on seismic behavior. The primary objective is to understand how RC slabs and connection details—flush, extended, and welded—affect stiffness, load-carrying capacity, ductility, and failure mechanisms under both monotonic and cyclic loading conditions.

An extensive experimental campaign provided benchmark data for validating advanced finite element models that accurately replicate the interactions among steel components, bolted connections, and RC slabs. The results reveal that RC slabs enhance initial stiffness and load capacity through composite action but can reduce ductility and complicate reparability due to damage at the slab-to-beam interface. Flush end-plate connections offer greater ductility yet lower stiffness, while extended end-plate connections provide higher strength and facilitate easier link replacement. Moreover, cyclic loading tests indicate that composite links experience more abrupt stiffness degradation and localized plastic strain accumulation compared to bare-steel links.

Overall, this research offers valuable insights for optimizing EBF design to achieve a balanced performance between seismic resilience and post-earthquake reparability.