



Experimental Investigation on Flexural Behavior of Precast Beam-beam Connections Using Mechanical Connectors

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Abstract

The present study discusses two distinct forms of novel connections to join precast concrete beam elements using couplers and U-bolts. Monotonic testing (Three-point bending) was conducted to investigate the flexural behaviour as well as feasibility and reliability of proposed connections. The couplers and U-bolts have been placed at the centre of the connection region which connects the beam elements. The overall performance of the connection was varied with respect to location of couplers and U-bolts. Also, the shear key and high-performance materials were used in the connection region to enhance its flexural performance. The key parameters obtained from bending test such as load-deflection behaviour, stiffness degradation, energy dissipation capacity, failure pattern illustrates the satisfactory performance of the proposed connections. The test's failure pattern shows that the coupler-enabled specimens exhibited flexural ductile failure and were successful in efficiently transferring stresses. Due to a lack of adhesion between the old concrete and the new HPFRCC mix, the U-bolts enabled specimen experienced interface failure. In order to prevent interface failure, surface treatment must be done between structural elements utilizing various adhesives. In comparison to coupler-enabled specimens, the U-bolts specimen performed better in terms of energy dissipation and load carrying capacity.

Keywords: Precast structural elements, Hybrid rebar coupler, U-bolts, Shear key, High performance materials