



Static Behaviour of Reinforced High Strength Concrete Haunched Beams Strengthened by Using Epoxy Bonded External Steel Plates

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Abstract:

Strengthening of concrete haunched beams with epoxy bonded external steel side plates in shear is becoming on increasing by popular retrofit technique among researchers and engineering worldwide. Concrete of higher compressive strength have been produced currently, and increasingly used by the designers and contractors. Therefore, the main purpose of the research described in this paper is to give better and full understanding of the shear behaviour of high strength concrete rectangular beams strengthened with epoxy bonded external steel side plates and subjected to static load. The main variables studied were the geometric dimensions of bonded steel plates, width, position and arrangements, thickness of plate bonded on both sides of shear zone of beams, the effect of haunches (Negative haunches (-0.20) and positive haunches (+0.20)) and effect of quality degree of used concrete strength. During the tests cracking load, ultimate load, concrete strains, steel strains and deflection under load application were measured Test results showed that the width, position, arrangements and thickness of plate used considerably affects strength, deformation and mode of failure of the tested beams. Increasing the width, position, arrangements and thickness of plate bonded on both sides of shear zone of beams increases the cracking and ultimate capacities of the strengthened beams. Increasing the quality degree of concrete strength decreases the relative cracking and ultimate capacities of the strengthened beams compared to unstrengthened beams. The change from positive haunches (+0.20) to Negative haunches (-0.20) increases the cracking and ultimate capacities of the strengthened beams.

Keywords:

High Strength RC; Haunched Beams; Strengthening; Steel Plates

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