Experimental Investigation on FRC Beams Strengthened with GFRP Laminates

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ABSTRACT: The external bonding of fibre reinforced polymer (FRP) to reinforced concrete (RC) members has become a popular method of retrofitting/strengthening concrete structures in recent years. Extensive research has been conducted pertaining to RC beams strengthened with FRP laminates. However, the experimental studies on fibre reinforced concrete (FRC) beams strengthened using externally bonded FRP system are limited. The purpose of this research is to investigate the behaviour of steel fibre reinforced concrete (SFRC) beams strengthened with glass fibre reinforced polymer (GFRP) laminates. The beam specimens were incorporated with 1.0% volume fraction of short-steel fibres randomly distributed throughout the section. The beam cross-section was 150 mm wide and 250 mm deep and to a length of 3000 mm. All the beams were tested until failure. The study parameters of this investigation included service load, ultimate load, ductility, crack width and failure modes. Beams tested for this investigation consisted of reference (RC) beam, GFRP laminated RC beam, SFRC beam, and GFRP laminated SFRC beam. The test results showed that the SFRC beams strengthened with GFRP laminates exhibited better performance.

KEYWORDS: Glass fibre reinforced polymer, steel fibre, strength, ductility, debonding.