Fiber-Reinforced Polymer as External Reinforcement for Concrete Beams: An Experimental Study

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Abstract:

This paper presents an experimental investigation of Reinforced Concrete (RC) beams with external flexural–shear strengthening using different combinations of externally bonded hybrid fabrics reinforced polymer composite: Carbon and Glass fabric reinforced polymer composite (CFRP and GFRP), which are widely used and another fabric reinforced polymer composite based on vegetable fibre it is the jute fibre (JFRP). The vegetable fibres offer promising prospects thanks to their attractive, specific properties, because of their low density, but also with their biodeterioration. This study's objective is to conjugate the properties of each type of fibre fabric to increase the load capacity, rigidity and ductility of RC beams and obtain a typical reinforcement beam model that provides the three desired mechanical properties (Strength, stiffness and ductility). A control beam and nine beams strengthened in flexure with GFRP, CFRP, JFRP and hybrid fibre fabrics were conducted. The RC beams were tested under three-point bending to study the flexural effectiveness of the proposed hybrid fabrics. The load-deflection response, rigidity, ductility and associated failure modes of the tested specimens had been recorded and analyzed.

Keywords:

Hybrid FRP, composites materials, rigidity, ductility, loead-deflexion, jute fiber.