

Behaviour of reinforced GFRP bars concrete beams having strengthened splices using CFRP sheets

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Abstract:

When glass fibre-reinforced polymer (GFRP) bar splices are used in reinforced concrete sections, they affect the structural performance in two different ways: through the stress concentration in the section, and through the configuration of the GFRP–concrete bond. This study experimentally investigated a new method for increasing the bond strength of a GFRP lap (two GFRP bars connected together) using a carbon fibre-reinforced polymer (CFRP) sheet coated in epoxy resin. A new splicing method was investigated to quantify the effect of the bar surface bond on the development length, with reinforced concrete beams cast with laps in the concrete reinforcing bars at a known bending span length. Specimens were tested in four-point flexure tests to assess the strength capacity and failure mode. The results were summarised and compared within a standard lap made according to the ACI 318 specifications. The new method for splicing was more efficient for GFRP splice laps than the standard lap method. It could also be used for head-to-head reinforcement bar splices with the appropriate CFRP lapping sheets.