RETROFITTING OF REINFORCED CONCRETE CURVED BEAMS FAILED IN SHEAR UNDER OUT OF PLANE LOADING USING CARBON FIBRE REINFORCED POLYMER

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DECLARATION

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ABSTRACT

Carbon Fibre Reinforced Polymer (CFRP) strengthening techniques have gained popularity compared to other retrofitting methods due to its superior performance. While ample research had been done regarding retrofitting of straight beams that have failed in shear, as per the author's knowledge no research has been done regarding the retrofitting of curved beams that have failed in shear under out of plane loading. Due to the curvature of the beam, bending, shear and torsion all act together in resisting loads and hence it is important to study the effects of these on CFRP retrofitted curved beams.

An experimental study consisting of four curved beams of 2m and 4m radii of curvature, which had previously failed under the combined effect of shear and torsion for out of plane loading were selected and were externally retrofitted using CFRP strips. The beams were then re-tested for their new failure loads and the load carrying capacities were compared with their original values.

From the experimental program it was observed that two beams exhibited load carrying capacities of 122% and 117% of their original value while the other two exhibited load carrying capacities of 85% and 90%. The predominant mode of failure was CFRP strip de-bonding from its substrate. Therefore it was identified that by anchoring the CFRP strips to the substrate the carrying capacity could be significantly increased by delaying de-bonding load by distributing stresses across two of more CFRP strips.

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