

Shear repair for reinforced concrete by fiberglass plate bonding

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Abstract: Reinforced concrete structures often exhibit structural and nonstructural cracking due to a variety of reasons. Major cracks are signs of distress and require immediate attention. Results from a study on strengthening of reinforced concrete beams having deficient shear strength and showing major diagonal tension cracks are presented in this paper. The beams with deficient shear strength were damaged to a predetermined level (the appearance of the first shear crack) and then repaired by fiberglass plate bonding (FGPB) techniques. Different shear repair schemes using FGPB to upgrade beams' shear capacity were used: FGPB repair by shear strips, by shear wings, and by U-jackets in the shear span of the beams. Experimental data on strength, stiffness, steel strain, deflection, and mode of failure of the repaired beams were obtained, and comparisons between the different shear repair schemes and the unrepaired control beams were made. Shear repair by FGPB is shown to increase shear capacity and restore the degraded stiffness of the beams. The study results also show that the increase in shear capacity by FGPB was almost identical for both strip and wing shear repairs. However, this increase was not adequate to cause beams repaired by these two schemes to fail in flexure. On the other hand, the enhanced shear capacity by U-jacket was sufficient that flexural failure occurred for these beams.