

Strengthening of initially loaded reinforced concrete beams using FRP plates

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Abstract: The repair of initially loaded reinforced concrete (RC) beams with epoxy-bonded fiberglass reinforced plastic (FRP) plates is experimentally investigated. The RC beams are initially loaded to 85 percent of the ultimate flexural capacity and subsequently repaired with FRP plates, bonded to the soffit of the beam. The plate thickness is varied to assess the premature failure initiated at the plate curtailment zone due to the high concentration of shear and peeling stresses. Different repair and anchoring schemes are conducted in an effort to eliminate such failures and insure ductile behavior. The behavior of the repaired beams is represented by load-deflection curves and the different modes of failure are discussed. The results generally indicate that the flexural strength of the repaired beams is increased. The ductile behavior of the repaired beams is inversely proportional to the plate thickness. The use of an I-jacket plate provided a proper anchorage system and improved the ductility of beams repaired with plates of large thickness.