

Flexural behaviour of precracked reinforced concrete beams strengthened externally by steel plates

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Abstract: This paper presents comprehensive data and their interpretation on the plate bonding repair technique in terms of effects of plate thickness and end anchorage on ductility, ultimate load, and mode of failure. Reinforced concrete (RC) beams were preloaded to 85 percent of their ultimate capacity and subsequently repaired by bonding steel plates of different thicknesses with and without end anchorages. Anchor bolts were used for end anchorages. The repaired beams showed higher strength than the original beams, provided the plates did not exceed a certain limiting thickness. Increasing the plate thickness changed the mode of failure of the repaired beams from flexural to premature failure, developed due to shear and/or tearing of the plate, causing a reduction in ductility. End anchorages to the bonded plates could not prevent the premature failure of the beams but improved ductility with decreasing significance as the plate thickness increased, and yielded a marginal improvement in ultimate strength. A procedure for designing the bonding plate to avoid premature failure is suggested.