

Shear Strengthening of RC T-Beams by Means of CFRP Sheets

Authors : Omar A. Farghal

Abstract : This research aimed to experimentally and analytically investigate the contribution of bonded web carbon fiber reinforced polymer (CFRP) sheets to the shear strength of reinforced concrete (RC) T-beams. Two strengthening techniques using CFRP strips were applied along the shear-span zone: the first one is vertical U-jacket and the later is vertical strips bonded to the beam sides only. Fibers of both U-jacket and side sheets were vertically oriented ($\theta = 90^\circ$). Test results showed that the strengthening technique with U-jacket CFRP sheets improved the shear strength particularly. Three mechanisms of failure were recognized for the tested beams depending upon the end condition of the bonded CFRP sheet. Although the failure mode for the different beams was a brittle one, the strengthened beams provided with U-jacket CFRP sheets showed more or less a ductile behavior at a higher loading level up to a load level just before failure. As a consequence, these beams approved an acceptable enhancement in the structural ductility. Moreover, the obtained results concerning both the strains induced in the CFRP sheets and the maximum loads are used to study the applicability of the analytical models proposed in this study (ACI code) to predict: the nominal shear strength of the strengthened beams.

Keywords : carbon fiber reinforced polymer, wrapping, ductility, shear strengthening

Conference Title : ICCCGE 2014 : International Conference on Civil, Construction and Geological Engineering

Conference Location : Toronto, Canada

Conference Dates : June 16-17, 2014