

Behavior of Square Reinforced-Concrete Columns Strengthened with Carbon Fiber Reinforced Polymers under Eccentric Loading

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Abstract : In this paper, an experimental study on twelve square columns was conducted to investigate the influence of cross-sectional size on axial compressive capacity of carbon fiber reinforced polymers (CFRP) wrapped square reinforced concrete (RC) short columns subjected to eccentric loadings. The columns were divided into three groups with three cross sections (200×200×1200, 250×250×1500 and 300×300×1800 mm). Each group was tested under two different eccentricities: 10% and 20% of the width of samples measured from the center of the column cross section. Four columns were developed in each arrangement. Two columns in each category were left unwrapped as control samples, and two were wrapped with one layer CFRP perpendicular to the specimen surface. In general; CFRP sheets has enhanced the performance of the strengthened columns compared to the control columns. It was noticed that the percentage of compressive capacity enhancement was decreased by increasing the cross-sectional size, and increasing loading eccentricity generally leads to reduced load bearing capacity in columns. In the same group specimens, when the eccentricity increased the percentage of enhancement in load carrying capacity was increased. The study concludes that the optimum use of the CFRP sheets for axial strength enhancement is for smaller cross-section columns under higher eccentricities.

Keywords : CFRP, columns, eccentric loading, cross-sectional

Conference Title : ICBMCCSS 2018 : International Conference on Building Materials, Construction Components, Structures and Systems

Conference Location : London, United Kingdom

Conference Dates : June 28-29, 2018