Behavior of Reinforced Concrete Short Columns with Heavy Reinforcement Subjected to Axial Compression and Biaxial Bending

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ABSTRACT:

Reinforced concrete columns are sometimes subjected to axial load and biaxial bending as a result of their positions in a structure. A typical example is the corner column in flat slab building or columns resisting earthquake or wind loads. Due to architectural or mechanical restrictions, especially in high rise buildings, limited cross section of columns may be essential. Increasing the reinforcement ratio of these columns is one of the alternatives available to solve such problem. The aim of this paper is to investigate the behavior of concrete square short columns with heavy reinforcement subjected to axial load and biaxial bending. Modeling of such columns is achieved by using a three dimensional finite element model through the general purposes computer program (ANSYS). The results of the analytical model were verified with the previous available experimental results for concentric as well as eccentric loaded square columns. The results of this comparison reveal the efficiency of the proposed finite element model in simulating such columns. Different parameters have been encountered in this research to understand the overall behavior of heavy reinforced concrete columns under the effect of axial load and biaxial bending. These different parameters are the load eccentricity (e / t = 0.125, 0.375 and 0.625), the reinforcement ratio (8.0 % and 10.7 %), the inner reinforcement to the total reinforcement ratio (0, 0.25, 0.5 and 0.75) and the distribution of steel in compression and tension zones. The analytical results of this parametric study reveal the important of concentrating the reinforcement ratio in the compression zone rather than the tension zone since it enhances the load carrying capacity.