AN EXPERIMENTAL STUDY OF DEFECT'S EFFECTS IN DETAILING ON THE AXIAL CAPACITY OF EXISTING CONCRETE COLUMNS

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Keywords: Reinforced Concrete Column, Transverse Bar, Detailing, Stress-Strain Curve, Confinement

Recent earthquakes have proved the lack of sufficient strength and ductility of old buildings, which can cause extensive damage and even collapse of these buildings. Seismic repair of existing concrete structures is the major challenge in this century. The first step in seismic rehabilitation of existing concrete structures is evaluating seismic behaviour of these structures. To investigate the response of concrete structures, knowing the response of involved material from seismic point of view (i.e. the behaviour of concrete and rebars under cyclic reversal loading) is the first important stage. Using the behaviour of material, the predicting behavior of members is performed. Columns are the main members of the structures, that realize the actual seismic behavior of these members, give us a major help in estimation of ductility capacity and energy dissipation capacity which are important for seismic evaluation.

Figure 1. Setup view


Figure 2. Damaged Specimen

The purpose of this research is the study of defect's effects in the transverse reinforcement details such as: bend type of transverse reinforcement, anchorage of transverse reinforcement, spacing and volume of transverse reinforcement, on the axial behavior of reinforced concrete columns in the existing buildings. On this basis, 6 concrete specimens with 1/2 scale and the length of 1000 mm and the cross section dimension of 300*300 mm, have been tested on the effect of vertical axis in the structures laboratory of faculty of engineering of University of Tehran. It should be noted that all specimens are 28-day compressive strength of 25 Mpa. Samples are made with similar characteristics of old buildings and reinforced with plain bars by 90 and 135 degree bending stirrups.

The test setup and loading system are shown in Figure 1. Figure 2 shows the mode of failure of specimens and final appearance of them. Based on tests results, provide parametric curves to response the compressive strength of specimens as the stress-strain (δ - ε), that will be compare to the values of seismic guidelines such as FEMA and NZSEE.

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