ABSTRACT

BEHAVIOUR OF AXIALLY LOADED REINFORCED CONCRETE COLUMNS AND A SUGGESTION FOR ELASTICITY MODULUS

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According to the current standards, Elasticity Modulus (Young's modulus) of concrete and steel materials is given individually. There is no established elasticity modulus exists for reinforced concrete sections. For the displacement calculations, the elasticity modulus is used which is calculated by considering only the compressive strength of concrete. However, the section contains steel reinforcements too. In this study, the elasticity modulus of a reinforced concrete section is tried to be determined depending on the reinforcement ratio. A 100 tons capacity axial compression test setup is constructed at the BAU, Engineering and Architecture Faculty, Civil Engineering Department, Structural Laboratory and the prepared column specimens are fractured by axial loading.

Experimental results and the analytical solutions that are calculated by means of a commercial package program Response-2000 are compared with each other and the effect of the calculated elasticity modulus -which dependent on the ratio of the reinforcement- to displacements are examined.

It is observed from the experimental results of this thesis that the elasticity modulus increases with the ratio of the reinforcement existent in the section, and also it is observed that the σ-ε curves that are obtained by empirically and by analytically are considerably closed to each other.

By the help of the experimental results regression analysis is performed and for the calculated elasticity modulus -which dependent on the ratio of the reinforcement- the formula defined as $E_{rc} = 10270\sqrt{f_{ck}} + 3000000\rho + 130000$ (kg/cm^2) is proposed.

KEYWORDS: Reinforced Concrete / Elasticity Modulus / Stress-Strain Curve / Reinforcement Ratio/ Displacement