Abstract

Due to some special features of High-strength concrete , such as high compressive strength , resistance against corrosive factors and frost cycles and low permeability , this kind of concrete is increasingly used nowadays, therefore, knowing effective parameters on nonlinear behavior of this material is necessary to have inelastic analysis of structures which this material is used in their construction. One of parameters that has a noticeable effect on tensile elements behavior, which are built of high strength concrete , or materials behavior in tensile limit of reinforced concrete elements , is tensile stiffening phenomenon.

Experimental method that is the best method to investigate materials behavior is used to investigate tensile stiffening phenomenon. Different factors like thickness of concrete cover on reinforcement rebar, concrete compressive strength, diameter and features of reinforcement rebar , reinforcement percentage, mechanical features of reinforcement rebar and concrete are effective on tensile behavior. To consider these parameters, 108 reinforced concrete samples which their lengths are 70 mm that are reinforced with a bar reinforcement in their centers are tested.

These samples are classified into three categories which their compressive strength are different. In each category , exterior diameters of concrete samples are 65, 110, 150 mm and diameters of reinforcement rebars are 12 and 16 mm. aim of these choices is achievement of c/d proportion (c= cover, d= rebar diameter)(c/d = 2.2, 1.53, 4.08, 2.94, 5.75, 4.19).

With direct tensile test on introduced samples , behavior of average load-displacement of samples is evaluated. Results show that for samples with the same diameter (d) ,as the concrete cover (c) gets thicker, (c/d and d/ρ increase) fewer transverse cracks are observed and cracks interspace gets further. And enhancement of cover thickness on rebar ,increases appearance force of early crack. Change of bar type from AIII to AIV caused enhancement of sample stiffness.

Key words : tensile stiffening, high strength concrete, concrete tensile stress, AIII and AIV bar.

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Experimentally Investigating Effects of Yielding Stress of Steel and Strength of Concrete on Tension - Stiffening of RC Speciments under Tension

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