EFFECT OF AXIAL STIFFNESS OF FRP BARS
LONGITUDINAL REINFORCEMENT ON THE SHEAR
CAPACITY OF RC BEAMS; FEM ANALYSIS

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Abstract:

Use of FRP re-bars has increased rapidly since the last decade to avoid the deterioration of concrete structures caused by corrosion of steel reinforcement. Since FRP bars made from high tensile strength fibers such as carbon, glass, aramid and basalt embedded in polymeric matrices, they are anti-corrosion materials. However, the mechanical properties for FRP are different from steel bars; some types of FRP bars have a low relatively modulus of elasticity in comparison with conventional steel bars. Therefore shear capacity of RC beams reinforced with FRP bars could be different than those reinforced with steel bars, in this study a parametric analysis based on the finite element simulation was devoted to evaluate the effect of the axial stiffness of the reinforcement when FRP bars are used on the shear strength of RC beams. The analysis program consisted of two series of beams with concrete compressive strength 13 MPa and 33.5 MPa with six values for the elastic modulus of the reinforcement 35, 51.5, 100, 150, 209 and 300 GPa with reinforcement ratio 0.91% and shear span to depth ratio 3.0, It was found that the reinforcement axial stiffness significantly influences the depth of compression zone and the shear strength of beams as well as the service load.

Keywords:

Shear failure, Service load, FRP re-bars, Finite element analysis

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