(1)

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 rabidly 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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Bond strength and effective bond length of FRP sheets/plates bonded to concrete considering the type of adhesive layer

Abstract:

Recent experimental results of the FRP–concrete bonded joint using flexible adhesive showed that the most popular analytical models available in the literature underestimate the bond strength and the effective bond length of these experiments. Most of these existing models need to be modified to consider the type of adhesive layer. Consequently, the bond strength model proposed by Chen and Teng (2001) has been modified to consider the type of adhesive layer. An extensive database consisting of about 100 test results of FRP–concrete joint has been assembled to examine the validity of the proposed model taking the type of adhesive layer into consideration. The modified bond strength model is accurately capable of predicting the bond strength and the effective bond length.

Keywords:

Keywords: A. Fibres B. Fracture B. Strength C. Analytical modelling Flexible adhesive

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Prediction of axial compressive strength of reinforced concrete circular short columns confined with carbon fiber reinforced polymer wrapping sheets

Omar Ahmed Farghal and Hesham Mohamed Ahmed Diab

Abstract:

External confinement of concrete columns by means of carbon fiber reinforced polymer (CFRP) sheets can be considered as an efficient technique for their structural strengthening. An experimental research program including 18 circular short column specimens were tested under axial compression load, to investigate the gain strength of reinforced concrete (RC) columns confined with CFRP sheets. The parameters studied were both the volume and configurations of CFRP sheets, the size of cross-section, the percentage of main reinforcement, and the volume of internal stirrups. On the basis of the obtained results, mathematical models (Egyptian code and American Concrete Institute code) proposed to predict the axial compressive strength of non-slender RC column strengthened by means of CFRP sheets are evaluated. These codes showed an underestimation in predicting the axial compressive strength of RC strengthened columns. This, from the authors’ point of view, is attributed mainly to the fact that the proposed models overlooked the amount of internal stirrups when calculating the strength of strengthened columns. Therefore, modifications in the studied models were considered. The modifications take the effective lateral confining pressure due to presence of internal steel stirrups into account. The modified codes showed an acceptable approach to the experimental results.

Keywords:

Carbon fiber reinforced polymer (CFRP) sheets, wrapping, confinement

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SOME PARAMETERS AFFECTING THE STATIC BEHAVIOR OF NORMAL STRENGTH RECTANGULAR R.C. SHORT COLUMNS CONFINED BY CFRP

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Abstract:

SOME PARAMETERS AFFECTING THE STATIC BEHAVIOR OF NORMAL STRENGTH RECTANGULAR R.C. SHORT COLUMNS CONFINED BY CFRP

Keywords:

Carbon Fiber Reinforced Polymer (CFRP) , strengthening, efficiency, rectangular R.C. columns.

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Keywords:

Carbon fiber reinforced polymer (CFRP) sheets, wrapping, confinement

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Exploratory study of adopting longitudinal column reinforcement details as a design-controllable tool to seismic behavior of exterior RC beam-column joints

Fahmy, Mohamed F.M.; Farghal, Omar A.; Sharobeem, Girgis F.G.

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