Experimental and Numerical Analysis of Flexural Behavior of Layered Polyethylene (PET) Fibers RC Beams

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Nonlinear numerical analysis of nine reinforced concrete beams with dimensions (150 x 200 x 1200) width, height and length, respectively, was carried out through the finite element theory using the ANSYS software (version 15) to know the effect of different properties of layers in the one beam on the flexural behavior of reinforced concrete beams. The beams are consisting from two layers for the one cross-section. three beams are similar properties layers and the other six are with different properties layers. The beams differ among them depending on the percentage of Polyethylene terephthalate (PET) fibers added, the location of the fibrous concrete layer as well as the thickness of the layer. PET fibers were added in proportions (0%,0.5%, and 1%) from volume of the one layer, with dimension (50 x 4 x 0.3) mm length, width, and thickness respectively. All beams are reinforced with steel reinforcement (6 mm diameter at the top, 10 mm diameter for reinforcement against shear and 12 mm diameter in the tension area). The mechanical properties of each type of mixture have been studied. It was found that the different properties of the layers significantly affected the flexural behavior of reinforced concrete beams. Also the results of the numerical modeling were very close to the laboratory results obtained from the practical study, where the largest difference between the two studies was 8% and 11% for the load and deflection respectively at the ultimate point.