Estimating the behavior of RC beams strengthened with NSM system using artificial neural networks

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ABSTRACT

In the last decade, conventional materials such as steel and concrete are being replaced by fiber reinforced polymer (FRP) materials for the strengthening of concrete structures. Among the strengthening techniques based on Fiber Reinforced Polymer composites, the use of near-surface mounted (NSM) FRP rods is emerging as a promising technology for increasing flexural and shear strength of deficient concrete, masonry and timber members. An artificial neural network is an information processing tool that is inspired by the way biological nervous systems (such as the brain) process the information. The key element of this tool is the novel structure of the information processing system. In engineering applications, a neural network can be a vector mapper which maps an input vector to an output one. In the present study, a new approach is developed to predict the behavior of strengthened concrete beam using a large number of experimental data by applying artificial neural networks. Having parameters used as input nodes in ANN modeling such as elastic modulus of the FRP reinforcement, the ratio of the steel longitudinal reinforcement, dimensions of the beam section, the ratio of the NSM-FRP reinforcement and characteristics of concrete, the output node was the flexural strength of beams. The idealized neural network was employed to generate empirical charts and equations to be used in design. The aim of this study is to investigate the behavior of strengthened RC beam using artificial neural networks.

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