عنوان مقاله:

An artificial neural network (ANN) model for predicting themoment-rotation of exterior RC beam–column jointsstrengthened by CFRP composites

محل انتشار:

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نویسندگان:

H Akbarzadeh Bengar - *Department of Civil Engineering, University of Mazandaran, Babolsar, Iran*

J Shayanfar - *Department of Civil Engineering, University of Mazandaran, Babolsar, Iran*

S.M Seyedpoor - *Department of Civil Engineering, Shomal University, Amol, Iran*

خلاصه مقاله:

In the design of the ordinary moment resisting frame to form plastic hinges in beams, the principle ofweak-beam strong-column is used. Nevertheless, the plastic hinges take form in the beam and thevicinity of the column, the relocation of the plastic hinges is an adequate approach to increase theperformance of the joint and also the structure. One of the methods to achieve this goal is strengtheningthe joints with FRP material. Joints in real structures deal with some limitation, such as sides beamswhich are connected to the joints at the floor level. These conditions make some problems to strengthenthe joints. Therefore, the configuration of FRP application is considered in the form of L-shaped at thetop and bottom beam, wrapping for beam and wrapping for the columns. Also the specification ofmoment-rotation of the joint strengthened with FRP is a necessity to determine the effects ofstrengthened joints on nonlinear modeling of the frame. In this study, two types of external RC jointsare examined. The first category of joints that based on ACI-318 was designed for the moderateductility. The second category is similar to the first joints, but to improve the behavior joints CFRPsheets was used. After the numerical model of joint was confirmed by experimental model, a total of216 connections under monotonic load is simulated. Since the numeric modeling of the joint is a verytime consuming and expensive procedure, therefore training of a neural network to predict the momentrotationof the strengthened joint with FRP is another necessity. In this research, two neural networksare trained to predict the moment-rotation curves of the original joints and the strengthened joint usingthe moment-rotation curves of these joints. The results show moment-rotation curves obtained from thenumerical modeling and moment-rotation curves obtained from the neural networks have acceptableaccuracy.

کلمات کلیدی:

Beam–column joint, FRP scheme, nonlinear FE analysis, plastic hinge relocation, momentrotation, and neural network

لینک ثابت مقاله در پایگاه سیویلیکا: