Predicting the Bond Strength of thin Steel Rebars in Concrete by Means of Artificial Neural Networks

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Abstract - The bond strength between steel bars and concrete is one of the essential aspects of reinforced concrete structures and is generally affected by several factors. In this study, an experimental data set of 89 pull-out specimens was used to develop an artificial neural network (ANN). The data used in the modelling was arranged as 4 input parameters: bar surface, bar diameter (ϕ), concrete compressive strength (f_c) and the anchorage length (L_d). A comparative analysis was also conducted using the developed ANN model to establish the trend of the main influence variables on the bond capacity. The root mean squared error (RMSE) for the maximum applied load in the pull-out test, found on the testing data, was equal to 1.088 KN, and the R-squared was equal to 0.969, for the proposed ANN model. Moreover, the study concluded that the proposed could be used to predicts the bond strength of thin bars.

Keywords: Steel-concrete bond; Thin rebars; Artificial neural network.