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MULTIVARIATE NONLINEAR REGRESSION PREDICTION OF BOND STRENGTH OF FRP BARS IN CONCRETE

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ABSTRACT

In the reinforced concrete repair and strengthening industry, accurate prediction of fiber reinforcement polymer (FRP) concrete bond behavior is critical. The goal of this study is to conduct a Multivariate Nonlinear Regression (MNR) model for the bond strength of FRP bars in concrete. Nonlinear models may accommodate a wide range of mean functions and can give reasonable estimates of the model's unknown parameters with limited data sets. Several parameters that effect the bonding strength of FRP bars were identified and used to develop the nonlinear model including the compressive strength of concrete, embedment depth, concrete cover, bar diameter, and confinement. The model developed is valid irrespective of FRP type, surface roughness and texture, and failure mechanism namely, splitting and pull-out. A database of 327 test results from the literature is used to develop the model. The suggested nonlinear model estimates the bonding strength of FRP bars in concrete with great accuracy. The predictor factors used were discovered to be effective at describing bond strength of FRP bars in concrete. The developed equation outperforms the American Concrete Institute (ACI) model, which is frequently used.