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# New Models for Determining Concrete Elastic Modulus Considering Variation in Values of Compressive Strength

*Modulus of elasticity has played an essential role in the analysis and design of reinforced concrete structures and is a fundamental property required to calculate the lateral deformation of structures. This study proposes new models for predicting the elastic modulus of normal - and high-strength concrete using a hybrid polynomial neural network-invasive weed optimization algorithm (PNN-IWO). This paper attempts to estimate the elastic modulus concrete in terms of compressive strength in compliance with conventional building codes. To examine the validity of the proposed models, a comprehensive evaluation has been performed between the elastic modulus results predicted by PNN-IWO, experimental data, and those determined using buildings codes and various models. The assessment is performed in terms of coefficient of determination, root mean square error, and mean absolute error. It should be noted that the mean absolute error of the proposed model for normal- and high-strength concrete were calculated as 9.02%, 3.8%, respectively. The results demonstrate that the proposed models have a very strong potential to predict the elastic modulus of both normal- and high-strength concrete within the range of the considered compressive strength.*

Keywords: Concrete; Elastic modulus; Compressive strength; Polynomial neural network; Invasive weed optimization algorithm

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