Modeling of Polymer Modified-Concrete Strength with Artificial Neural Networks

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In this paper, artificial neural networks (ANNs) are used in attempt to obtain the strength of polymer-modified concrete (PMC). A database of 36 case records is used to develop and verify the ANN models. Four parameters are considered to have the most significant impact on the magnitude of (PMC) strength and are thus used as the model inputs. These include the Polymer/cement ratio, sand/cement ratio, gravel/cement ratio, and water/ cement ratio. The model output is the strength of (PMC). Multi-layer perceptron trained using the back-propagation algorithm is used. In this work, the feasibility of ANN technique for modeling the concrete strength is investigated. A number of issues in relation to ANN construction such as the effect of ANN geometry and internal parameters on the performance of ANN models are investigated. Design charts for prediction of polymer modified concrete strength are generated based on ANN model. It was found that ANNs have the ability to predict the strength of polymer modified concrete, with a very good degree of accuracy. The ANN models developed to study the impact of the internal network parameters on model performance indicate that ANN performance is reality insensitive to the number of hidden layer nodes, momentum terms or transfer functions. On the other hand, the impact of the learning rate on model predictions is more pronounced.