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Modeling Residual Modulus of Elasticity of Self-Compacted Concrete Using Artificial Neural Networks

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Abstract : Artificial Neural Network (ANN) models have been widely used in material modeling, inter-correlations, as well as behavior and trend predictions when the nonlinear relationship between system parameters cannot be quantified explicitly and mathematically. In this paper, ANN was used to predict the residual modulus of elasticity (RME) of self compacted concrete (SCC) damaged by heat. The ANN model was built, trained, tested and validated using a total of 112 experimental data sets, gathered from available literature. The data used in model development included temperature, relative humidity conditions, mix proportions, filler types, and fiber type. The result of ANN training, testing, and validation indicated that the RME of SCC, exposed to different temperature and relative humidity levels, could be predicted accurately with ANN techniques. The reliability between the predicated outputs and the actual experimental data was 99%. This show that ANN has strong potential as a feasible tool for predicting residual elastic modulus of SCC damaged by heat within the range of input parameter. The ANN model could be used to estimate the RME of SCC, as a rapid inexpensive substitute for the much more complicated and time consuming direct measurement of the RME of SCC.

Keywords : residual modulus of elasticity, artificial neural networks, self compacted-concrete, material modeling
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