

Comparison of Artificial Neural Network (ANN) and Response Surface Methodology (RSM) in Predicting the Compressive Strength of POFA Concrete

ABSTRACT

This study presents a comparative study between Artificial Neural Network (ANN) and Response Surface Methodology (RSM) in predicting the compressive strength of palm oil fuel ash (POFA) concrete. The comparison was made based on the same experimental datasets. The inputs investigated in this study were percentage of POFA replacement and water-to-cement ratio. The methods employed in ANN and RSM were feedforward neural network and face-centered central composite, correspondingly. The comparison between the two models showed that RSM performed better than ANN with coefficient of determination (R^2) closer to 1 with 0.9959. In addition, all the predicted results by RSM against the experimental results fell within 10% margin. For ANN model, however, three of its predicted results were outside the 10% margin. Percentage of POFA as cement replacement was also found to have greater impacts on the compressive strength of concrete than water-to-cement ratio. Lastly, the optimization of the proportions using RSM predicted that the maximum strength of POFA concrete is 32.19 MPa.