

Predicting the effective thermal conductivity of Alumina/water and Alumina/Ethylene glycol nanofluids using artificial neural network

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Abstract. The aims of the present study are to develop and validate an artificial neural network (ANN) approach to estimate the thermal conductivity ratio (TCR) of Alumina/water and Alumina /EG nanofluids as a function of temperature, volume fraction and diameter of the nanoparticle. For the purpose of evaluating the accuracy of the proposed model by ANN for both of Alumina /water and Alumina /EG nanofluids, root mean square error (RMSE) and regression coefficient (R^2) are utilized. The presented correlation relationship estimates empirical data very well. However, the artificial neural network for Alumina /EG has a higher regression coefficient and lower error compared to Alumina /water nanofluid. The results indicate that these two new models have great ability to predict thermal conductivity and show excellent agreement with the experimental results.

Keywords: Nanofluid, Thermal conductivity, Artificial Neural Network.