

Application of support vector regression and artificial neural network for prediction of specific heat capacity of aqueous nanofluids of copper oxide

ABSTRACT

This paper presents the modelling of the specific heat capacity (SHC) of CuO/water nanofluids using a support vector regression (SVR) and artificial neural network models (ANN). The models presented were developed from the experimental data of SCH of CuO nanoparticles, the volume fractions of CuO nanoparticles and fluid temperature. The volume fraction of CuO nanoparticles considered ranges from 0.4 to 2% while the temperature range includes 293–338 K. The results obtained revealed that the SVR model exhibits slightly higher accuracy compared to the ANN model. However, both the SVR and ANN models clearly demonstrate better prediction performance for the SHC of CuO/water nanofluids compared to the existing theoretical models. The results obtained in this study proves that machine learning models provide a more accurate estimation of SHC of CuO/water nanofluids and they are recommended for heat transfer calculations due to their superior accuracy.

Keyword: Nanofluids; Specific heat capacity; Support vector regression; Artificial neural network; Bayesian algorithm