Modeling and prediction of the specific heat capacity of Al2 O3/water nanofluids using hybrid genetic algorithm/support vector regression model — Source link ⎋

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ABSTRACT

In this study, the specific heat capacity of Alumina (Al$_2$O$_3$)/water nanofluid has been accurately evaluated using genetic algorithm/support vector regression (GA/SVR) model at volume fractions of 3.7–9.3%. The proposed (genetic algorithm/support vector regression) GA/SVR model was formulated using volume fractions and specific heat capacities of the alumina nanoparticles. The developed GA/SVR model is very accurate as determined from 99.998% correlation coefficient with experimentally obtained data and also has a root mean square error of 0.0014. Furthermore, the obtained results from the GA/SVR were compared with existing analytic models. Remarkably, the proposed model achieved an order of magnitude improvement over the model based on thermal equilibrium (Model II) and a two order of magnitude improvement over the model based on simple mixing rule for ideal gases (model I). Given the improvement in the accuracy, the proposed model would be useful for rapid and highly accurate estimation of the specific heat capacity of alumina/water nanofluids.