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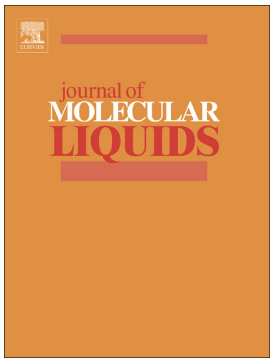

An experimental determination and accurate prediction of dynamic viscosity of MWCNT(%40)-SiO2(%60)/5W50 nano-lubricant

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An experimental determination and accurate prediction of dynamic visocosity of MWCNT(%40)-SiO_2(%60)/5W50 nano-lubricant

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Abstract

In the current research, dynamic viscosity of MWCNT(%40)-SiO_2(%60)/5W50 nano-lubricant were investigated experimentally. Dynamic viscosity of Nano-lubricant was measured at temperature range of 5˚C-55˚C, solid volume fraction between 0% and 1%, and fluid shear rate from 50 to 800 rpm. Study on rheological behavior of nanofluid against shear stress showed that the nanofluid has non-newtonian behavior. For presenting a relation between relative dynamic viscosity and independent parameters two methods were employed that are: artificial neural network and mathematical correlation. Results showed that, proposed correlation can estimate the value of relative dynamic viscosity with an acceptable accuracy. As an example the coefficient of determination (R-squared) was 0.9914, which represents a desirable value. An artificial neural network (ANN) for relative viscosity based on obtained data using the multi-layer perceptron (MLP) algorithm was designed. The results showed that the neural network with the appropriate instruction can estimate accurate value for dynamic viscosity.

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