ANALYSIS OF DYNAMIC VISCOSITY VIA EXPERIMENT AND EMPIRICAL CORRELATION THROUGH RESPONSE SURFACE METHODOLOGY (RSM) FOR CELLULOSE NANOCRYSTAL (CNC) DISPERSED IN ETHYLENE GLYCOL- WATER MIXTURE

D.Ramasamy[1*], K. Kadirgama[1*], K.Ramachandran[1], , W.H. Azmi[1], M. Samykano[1]

[1] Faculty of Mechanical Engineering, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia.
*deva@ump.edu.my

Introduction

Heat-transfer improvement is a vital challenge in thermal engineering. Due to their vast application in the thermal energy transfer, the researchers have found a latest method in enhancing the heat transfer performance by using nanofluid. Dispersion of nanosubstance not only enhances thermal conductivity but dynamic viscosity too. Viscosity enhancement is vital parameter that must be studied for the application purposes. It increases power consumption which reduces pump performance.

In this paper, Cellulose Nanocrystal (CNC) a nano-scaled fibril extracted from Western Hemlock plant is used to study viscosity enhancement. Nanofluid developed from cellulose based nanosubstance leads to a renewable and green applications. CNC with 7.4% weight concentration is dispersed into ethylene glycol-water mixture at 40:60 ratio. Dynamic viscosity is measured experimentally and empirical model is developed for relative viscosity. Experiments is carried out for nanofluid with volume concentration up to 0.9%. Minitab 17, statistic analytical tool is used for the mathematical model development.