Numerical Analysis of Experimental Turbulent Forced Convection Heat Transfer for Nanofluid Flow in a Tube

K.V.Sharma[1,a]*, W.H.Azmi[2,b], Subhash Kamal[3,c] and Suhaimi Hassan[4,d]

[1,4] Department of Mechanical Engineering, Universiti Teknologi PETRONAS, 31750 Tronoh, Malaysia

[2]Faculty of Mechanical Engineering, Universiti Malaysia Pahang, Pekan, Malaysia

[3]Department of Petroleum Engineering, Universiti Teknologi PETRONAS 31750 Tronoh, Malaysia

[a]kvsharmajntu@gmail.com*, [b]wanazmi2010@gmail.com, [c]subhashkamal@gmail.com

ABSTRACT

A numerical model for determining the characteristics of flow and heat has been presented by modifying the eddy diffusivity equation of Sarma et al. The experimental data of thermo-physical properties determined using spherical particles in a wide range of concentration, particle size, materials and operating temperatures are available in the literature. The numerical analysis employed equations, which were developed using the experimental data of thermo-physical properties, friction factor and Nusselt number. Based on the agreement of the numerical results with the experimental data, the influence of concentration and temperature on the turbulent characteristics is presented. It is observed that SiO2 nanofluid attained higher velocity and lower eddy diffusivity compared to Cu nanofluid at a concentration. The temperature gradient increases with concentration and decreases with temperature.

KEYWORDS: Nanofluids; Thermo-physical properties, Turbulent flow in a tube; Eddy diffusivity equation; Heat transfer coefficient; Friction factor

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