Study Of Forced Convection Nanofluid Heat Transfer In The Automotive Cooling System

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Abstract

The heat transfer enhancement for many industrial applications by adding solid nanoparticles to liquids is significant topics in the last 10 years. This article included the friction factor and forced convection heat transfer of SiO_2 nanoparticle dispersed in water as a base fluid conducted in a car radiator experimentally and numerically. Four different concentrations of nanofluids in the range of 1–2.5 vol% have been used. The flowrate changed in the range of 2–8 LPM to have Reynolds number with the range 500–1750. The results showed that the friction factor decreases with an increase in flowrate and increase with increasing in volume concentration. Furthermore, the inlet temperature to the radiator has insignificantly affected to the friction factor. On the other side, Nusselt number increases with increasing in flowrate, nanofluid volume concentration and inlet temperature. Meanwhile, application of SiO_2 nanofluid with low concentrations can enhance heat transfer rate up to 50% as a comparison with pure water. The simulation results compared with experimental data, and there is a good agreement. Likewise, these results compared to other investigators to be validated.

Keywords: Laminar; Nanofluid; Heat transfer; Car radiator; CFD

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