

Thermal management of vehicle radiator by nanocellulose with one-dimensional analysis

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ABSTRACT

This paper is about the nanocellulose with water and Ethylene Glycol for car radiator application. The research is conducted in order to prove that addition of nanocellulose from plant with varying concentration provides a better heat transfer efficiency compared to usage of distilled water as radiator coolant. The objective of the research is to analysis the performance of vehicle radiator using one-dimensional analysis based on collaboration of nanocellulose with readily available coolants which is Ethylene Glycol. The scopes of the research are the nanoparticles used in the experiment is nanocellulose between ranges of size 40-80 nm. The tested concentration of the cellulose nanofluids are as of 0.5%. Based on the nanocellulose properties, the performance characteristics of a radiator running with water and Ethylene Glycol were investigated using the one-dimensional numerical analysis method of one dimensional software. Radiator model was drawn and the results of the analysis is compared. The radiator model was developed corresponding to a real model of radiator. The radiator was simulated to study the characteristic of radiator performance when the radiator is operating with nanocellulose. The simulation results showed that the temperature decreases with the increasing in volume concentration. Furthermore, the heat transfer coefficient and effectiveness increases with increasing in percentage of nanocellulose.

KEYWORDS:

Thermal management; Vehicle radiator; One-dimensional analysis