A Critical Review on Application of Nanofluids as Coolants in Aautomobile Radiators

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In looking for ways to improve the aerodynamic designs of vehicles, and subsequently the fuel economy, manufacturers must reduce the amount of energy needed to overcome wind resistance on the road. This fact is partly due to the large radiator in front of the engine positioned to maximize the cooling effect of oncoming air. The use of nanofluids as coolants would allow for smaller size and better positioning of the radiators. Owing to the fact that there would be less fluid due to the higher efficiency, coolant pumps could be shrunk and car engines could be operated at higher temperatures allowing for more power while still meeting stringent emission standards.

To the best of our knowledge, a few investigations have been done in the field of using nanofluids in automobile radiator thus far. In this paper, we will investigate the previous works and will examine advantages and disadvantages of each one. Singh et al. [1] who were among the first investigators to conduct a study on car radiator working with several nanofluids. Saripella et al. [2] modeled the cooling system of a Class 8 truck engine. Their numerical simulations were performed replacing the standard coolant with nanofluid comprised of CuO nanoparticles suspended in a base fluid of a 50/50 mixture of ethylene glycol and water. The fluid dynamic and heat transfer performance of Al_2O_3 and CuO nanofluids in the flat tubes of a radiator has been studied numerically by vajjha et al. [3]. The effect of using the Cu-ethylene glycol nanofluid as a coolant in an automotive car radiator has been investigated by Leong et al. [4]. They observed that, overall heat transfer coefficient and heat transfer rate in engine cooling system increased with the usage of nanofluids compared to ethylene glycol alone. Peyghambarzadeh et al. [5, 6] examined experimentally forced convective heat transfer enhancement by using nanofluids in an automobile radiator. Different concentrations of nanofluids have been prepared by the addition of Al_2O_3 nanoparticles into the different base fluids.

References

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