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Numerical study of nanofluid heat transfer for different tube geometries – A comprehensive review on performance

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ABSTRACT

The heat transfer performance of a system can be improved using a combination of passive methods, namely nanofluids and various types of tube geometries. These methods can help enhance the heat transfer coefficient and consequently reduce the weight of the system. In this paper, the effect of tube geometry and nanofluids towards the heat transfer performance in the numerical system is reviewed. The forced convective heat transfer performance, friction factor and wall shear stress are studied for nanofluid flow in different tube geometries. The thermo-physical properties such as density, specific heat, viscosity and thermal conductivity are reviewed for the determination of nanofluid heat transfer numerically. Various researchers had measured and modelled for the determination of thermal conductivity and viscosity of nanofluids. However, the density and specific heat of nanofluids can be estimated with the mixture relations. The different tube geometries in simulation work are analyzed namely circular tube, circular tube with insert, flat tube and horizontal tube. It was observed that the circular tube with insert provides the highest heat transfer coefficient and wall shear stress. Meanwhile, the flat tube has greater heat transfer coefficient with a higher friction factor compared to the circular tube.