

Numerical Study of Heat Transfer Nanofluid TiO₂ through a Solar Flat Plate Collector

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Abstract : This paper illustrates a practical application of nanoparticles (TiO₂) as working fluid to stimulate solar flat plate collector efficiency with heat transfer modification properties. A numerical study of nanofluids laminar forced convection, permanent and stationary, is conducted in a solar flat plate collector. The effectiveness of these nanofluids are compared to conventional working fluid (water), wherein the dynamic and thermal properties are evaluated for four volume concentrations of nanoparticles (1%, 3%, 5% and 10%), and this done for Reynolds number from 25 to 800. Results from the application of those nonfluids are obtained versus pressure drop coefficient and Nusselt number are discussed later in this paper. Finally, we concluded that the heat transfer increases with increasing both nanoparticles concentration and Reynolds number.

Keywords : CFD, forced convection, nanofluid, solar flat plate collector efficiency, TiO₂ nanoparticles

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