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Numerical investigation of turbulent flow and heat transfer characteristics of PGW-CuO nanofluids

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In this paper, turbulent convection flow of CuO nanofluids of propylene glycol-water (30:70 by volume) as the base fluid and flowing in a circular tube, subjected to a constant and uniform heat flux at the wall, is numerically analyzed. The effects of nanoparticles concentrations and Reynolds number are investigated on the flow and the convective heat transfer behavior of CuO nanofluids. It is found that nanofluids containing more concentrations have shown higher heat transfer coefficient. The analysis is carried out in the nanoparticles volume concentration range from 0.1% to 1.2%. The heat transfer coefficient increases by 9% for 1.2% CuO nanofluids over the base fluid. The numerical results are compared with the experimental data and reasonable good agreement is achieved. The results showed the useful contribution to the heat transfer provided by the inclusion of nanoparticles, in comparison to the case with just the base fluid. Higher heat transfer coefficient obtained with nanofluids results in energy saving in heat transfer applications.

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