

Title:

Heat Transfer Enhancement in Pipe Using Al₂O₃ /Water Nanofluid

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Abstract:

Convection heat transfer is widely used in many industrial heat and cooling systems. The heat convection can be enhanced passively by adding metal nanoparticles in the water that have been adequately consumed. Small solid metals or nanoparticles of metal oxides floating in the base liquid increase the efficiency of thermal transmission in the system. Commercial CFD code FLUENT is used to simulate water-based nanofluids and is considered to be a single-phase fluid. The effects of various parameters such as Nusselt number and friction factor are studied as a function of Reynolds number and particle volume fraction. The volume fraction of 0.5, 1.0, and 2.0 percent of the Al₂O₃ nanoparticles was investigated, with Reynolds numbers between 6000 and 12,000. The numerical results show that nanofluids have a higher efficiency in convection heat than basic fluid and an improved thermal transfer efficiency with Reynolds numbers and volume concentrations.