

عنوان مقاله:

Numerical simulation of nanofluid forced convection heat transfer over a horizontal cylinder by smooth particle hydrodynamics

محل انتشار:

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خلاصه مقاله:

Nano-fluidic flow and heat transfer around a horizontal cylinder at Reynolds numbers up to 250 is investigated by using weakly compressible smoothed particle hydrodynamics (WCSPH). To be able to simulate enhanced nano-particle heat transfer, this manuscript describes for the first time a development that allows conductive and convective heat transfer to be modelled accurately for the Eckert problem using WCSPH. The simulations have been conducted for $Pr = 0.01$ to 40 with nanoparticle volumetric concentrations ranging from 0% to 4%. The velocity fields and the Nusselt profiles from the present simulations are in a good agreement with the experimental measurements. The results show that WCSPH is appropriate method for such numerical modelling. Additionally, the results of heat transfer characteristics of nano-fluid flow over a cylinder marked improvements comparing with the base fluids. This improvement is more evident in flows with higher Reynolds numbers and higher particle volume concentration.

کلمات کلیدی:

nanoparticles, nanofluid, smoothed particle hydrodynamics (SPH), forced convection

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