Numerical study of heat transfer in 90 bend tube by AL2O3 nanofluids using fluid injection

ABSTRACT

Purpose This paper aims to investigate increasing heat transfer in bend tube 90° by fluid injection using nano fluid flow that was performed by expending varying Reynolds number. This paper studies the increased heat transfer in the bent tube that used some parameters to examine the effects of volume fraction, nanoparticle diameter, fluid injection, Reynolds number on heat transfer and flow in a bend pipe. Design/methodology/approach Designing curved tubes increases the thermal conductivity amount between fluid and wall. It is used the finite volume method and simple algorithms to solve the conservation equations of mass, momentum and energy. The results showed that the nanoparticles used in bent tube transfusion increase the heat transfer performance by increasing the volume fraction; it has a direct impact on enhancing the heat transfer coefficient. Findings Heat transfer coefficient enhanced 1.5% when volume fraction increased from 2 % to 6%, the. It is due to the impact of nanoparticles on the thermal conductivity of the fluid. The fluid is injected into the boundary layer flow due to jamming that enhances heat transfer. Curved lines used create a centrifugal force due to the bending and lack of development that increase the heat transfer. Originality/value This study has investigated the effect of injection of water into a 90° bend before and after the bend. Specific objectives are to analyze effect of injection on heat transfer of bend tube and pressure drop, evaluate best performance of mixing injection and bend in different positions and analyze effect of nano fluid volume fraction on injection.

Keyword: CFD; Injection; Nano fluid; Bend tube