عنوان مقاله:

Heat Transfer Enhancement and Pressure Drop Analysis of a Cone Helical Coiled Tube Heat Exchanger using MWCNT/Water Nanofluid

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خلاصه مقاله:

In this investigation, the heat transfer and pressure drop analysis of a cone helically coiled tube heat exchanger handling MWCNT(Multi Walled Carbon nanotube)/water nanofluid have been carried out experimentally. The MWCNT/water nanofluids of ۰.۱%, ۰.۳%,and ۰.۵% particle volume concentration have been synthesized with the addition of surfactant Sodium dodecylbenzene solfonates by using two step method and characterized. The test runs conducted laminar flow in the Dean number range of ۴۸۱ < De < ۲۱۳۰ .The thermo physical properties have been determined by using the existing mathematical models. It is found that the tube side experimental Nusselt numbers are ۲۲%, ۴۱% and ۵۲% higher than water for the ۰.۱%,۰.۳% and ۰.۵% nanofluids volume concentration respectively. These are due to higher thermal conductivity of MWCNT nanofluid than water and better mixing of fluid and nanotube.. This may also be due to very strong secondary flow formation in cone coiled tube. It is also found that the pressure drop of ۰.۱%, ۰.۳% and ۰.۵% were found to be ۲۵%, ۵۰% and ۸۱% respectively higher than water. The increase in pressure drop is due to increase in nanofluid viscosity while adding nanotubes . The measurement of nanofluid thermal performance factor is found to be greater than unity. It is concluded that the MWCNT nanofluid can be applied as a coolant in cone helically coiled tube heat exchanger to enhance heat transfer with considerable pressure drop.

کلمات کلیدی:

MWCNT/water, Cone helically coiled tube, Nusselt number, Thermal conductivity, Secondary flow, Volume concentration