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Study the Effect on Heat Transfer using Nano Fluids

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Abstract—*Helically coiled tube heat exchangers are widely used in various industries such as piping systems, air conditioning, storage tanks, and chemical reactors. These types of exchangers are one of the compact heat exchangers types used to increase heat transfer rate, require less volume and weight compared with other types of heat exchangers. Important challenges faced by experts is the necessity to increase the heat fluxes and reduce the size of the heat exchangers. Nano-fluids have novel properties that render them potentially beneficial in a large number of heat transfer applications including microelectronics, heat exchangers, fuel cells, engine cooling, vehicle thermal management, hybrid-powered engines, chillers and nuclear reactors. There has been increasing interest in Nanofluid and its use in heat transfer enhancement. Nanofluids are suspensions of nanoparticles in fluids that show significant enhancement of their properties at modest nanoparticle concentrations.*

In this work, the heat transfer in helically coiled tube heat exchangers using nanofluids is to be investigated. Numerical and experimental methods are to be used to investigate the effect of physical properties of fluid (i.e. viscosity, thermal conductivity, specific heat capacity and density), operational parameters (i.e. the velocity and temperature of fluid) and geometrical parameters (i.e. pitch, diameter of the tube, diameter of shell's inlet, diameters of coil and shell, heights of coil and shell, and the distance between the inlet and outlet of the shell) on Nusselt numbers of both sides.

Here, the experiment has been done by varying the concentration of the nanoparticles in the base fluids at different coil side flow rates. Different parameters are calculated from the results obtained and graphs are plotted between various parameters such as Nusselt number, friction factor, pressure drop characteristics and performance index. These graphs have been analyzed and discussed to find out the optimal result for which the heat exchanger would give the best performance.