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Production of Al_2O_3 Nanofluids by two-step method

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Abstract:

Nanofluids are a novel category of heat transfer fluids, whereby nanoparticles are dispersed throughout a base fluid to form a composite medium. Aluminium oxide (Al_2O_3) nanofluids have emerged as a very promising category of nanofluids, primarily attributed to their exceptional thermal conductivity and commendable stability. The current work provides an experimental examination of the thermophysical parameters, heat transport characteristics, and friction factor of Al_2O_3 nanofluids. The nanofluids were synthesised via a two-step methodology, and their thermophysical characteristics were evaluated by a range of experimental approaches. The heat transfer and friction factor of the nanofluids were quantified by experimentation conducted in a forced convection loop. The findings indicated a positive correlation between the concentration of nanoparticles and the thermal conductivity of the nanofluids. The observed trend indicates that there is a positive correlation between the concentration of nanoparticles in the nanofluids and the heat transfer coefficient. Nevertheless, it was observed that the friction factor of the nanofluids exhibited an upward trend as the concentration of nanoparticles rose. The findings of this investigation indicate that Al_2O_3 nanofluids have promising characteristics for utilisation as heat transfer fluids with superior performance. Nevertheless, it is crucial to take into account the balance between heat transfer improvement and pressure drop during the design of heat transfer systems that use Al_2O_3 nanofluids.

Keywords:

Al_2O_3 Nanofluids Preparation, Thermophysical Properties, Heat Transfer, Friction Factor, Two Step Method, EDAX, TEM.