

Flow characteristics of alumina nanofluids

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Nanofluid is a novel heat transfer fluid prepared by dispersing nanometer-sized solid particles in traditional heat transfer fluids to increase thermal conductivity. Even though there have been many reports on the enhancement of thermal conductivity in the literature no systematic studies on the flow characteristics of nanofluids have been reported. In this research we have considered the friction factor of alumina nanofluids dispersed in distilled water. The nanofluids were prepared by dispersing 1 – 4 wt % of alumina nanoparticles obtained from Sasol North America in distilled water. Nano particles have plate, needle and cube shapes, and hence we can investigate the effect of particle shape. The dispersion status of the nanofluids was characterized by DLS, rheological and rheo-optical properties and sedimentation. The thermal conductivity was also measured. The experimental result shows that, regardless of particle shape, the friction factor slightly increases in the laminar region while the friction factor is the same within the experimental error when plotted against Reynolds number based on the viscosity of distilled water. There appears a counteracting effect of weakening of the turbulence strength by the added nano particles and the increased viscosity.