EFFECT OF DIFFERENT PARAMETERS ON THE STABILITY OF ALUMINA NANOFLUIDS

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Nanofluids are a class of working fluid used in heat transfer systems, they are colloidal suspensions composed by nanoparticles (1-100 nm) dispersed in a fluid. Nanofluids have been presented as new generation fluids with potential to increase the energy efficiency in heat exchangers. However, stability problems of nanoparticles dispersed have limited their industrial level scaling.

An experimental study was carried out to evaluate the effect of nanoparticle concentration, surfactant type and concentration, power of ultrasonication, dispersion time and elapsed time after ultrasonication on the stability and thermal conductivity of Alumina (Al₂O₃) nanofluids using an experimental fractional factorial design 2ᵏ. Alumina nanoparticles (< 50 nm of particle diameter) were dispersed in desionized water using an ultrasonic processor (Ultrasonicator, QSONICA 500). The mass concentrations of the nanoparticles in water were 0.1 and 0.5% wt. Sodium dodecylbenzene sulfonate (SDBS) and Cetiltrimethylammonium bromide (CTAB) were used as surfactants. The stability of the nanofluids in static mode was monitored using visual inspection and UV visible spectroscopy (Spectrophotometer, Agilent 8453). The effective thermal conductivity of nanofluids was measured using a KD2 Pro thermal property meter (Decagon, Instruments). Results showed that parameters such surfactant type and nanoparticle concentrations have an important effect on the stability and thermal conductivity of Alumina nanofluids.

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