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Thermal conductivity of water based magnetite ferrofluids at different temperature for heat transfer applications (Conference Paper)

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Abstract

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Magnetic magnetite , Fe₃O₄ nanoparticles produced by Massart's procedure were used to prepare water based magnetite , Fe₃ O₄ ferrofluids without addition of any stabilizing agent or surfactant. The thermal properties and suspension stabilization of the ferrofluids were investigated by varying the magnetite , Fe₃ O₄ nanoparticles concentration in the ferrofluids prepared. The thermal conductivity of water based ferrofluids prepared using five different volume fraction of magnetite , Fe₃ O₄ suspension (0.1, 0.05, 0.02, 0.01 and 0.005) were measured at five different temperature , 25°C, 30°C, 40°C, 50°C and 60°C in order to evaluate its potential application as heat transfer fluid. The results shows that the thermal conductivity of the ferrofluids are higher than the base fluid, and the thermal conductivity of the ferrofluids increased as the magnetite concentration in the ferrofluids decreased however reached its optimum for ferrofluids prepared using 0.01 volume fraction of magnetite suspension over 0.99 volume fraction of water . Accordingly, the thermal conductivity of the ferrofluids significantly increased as the temperature increased where 49.4% enhancement with respect to water were observed at temperature 60°C. © 2018 Trans Tech Publications, Switzerland.

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