Experimental Study on Chemical Stabilization of Nanofluids Suspension

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Heat transfer fluids, such a water, mineral oil and ethylenglicol play a vital role in many industrial proceses. The poor heat transfer properties of these common fluids compared to most solids is a primary obstacle to the high compactness and effectiveness. To improve the energy efficient of these process exist two possibilities: reduce the size of the fluid circulation channels or dramatically increase heat transfer. In the last sense, the nanofluids - suspension of ultrafine particles in a conventional base fluid- tremendously enhance the heat transfer characteristic of the original fluid [1, 2].

The industrial groups that would benefit from such improved heat transfer fluids are quite varied and included solar thermal collectors, transportation, electronics, medical, food and manufacturing.

The use of solid particles suspended in fluids for improving heat transfer of conventional fluids is a technique that has developed over 100 years ago, using millimeter particles. However, in these scales, there are many problems such as abrasion, sedimentation, locking mechanisms, etc. The recent advances in materials technology have made possible the production of nanoparticles (particles between 1 and 100 nm) that could solve some of these problems.

However, there are still many issues for understanding including the explanation of the anomalous increase in thermal conductivity, the stabilization of the nanofluids and other practical issues such as the effect of nanofluids on sedimentation and erosion.

In this study, we focus on the chemistry and preparation of material. Nanofluids require a stable and durable suspension, with low clusters of particles and that does not interact with the fluid changing its chemical composition. Therefore, for the practical applications of the nanofluids at large scales, at a first step it is crucial to develop an adequate chemical method of preparation of nanoparticles and suspensions. In particular, we study the influence of dispersants on nanofluids stabilization .

References

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[2] J.R.Vazquez Peñas, J.M.Ortiz de Zarate, M- Khayet, “Measurement of the thermal conductivity of nanofluids by the multicurrent hot-wire method”, Journal of Applied Physics 104, (2008).