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Thermal conductivity behaviour of magnetic fluids[1] R.A. MEDINA-ESQUIVEL, J. MENDEZ-GAMBOA, J. TAPIA, FIUADY, J.J. ALVARADO-GIL, CINVESTAV-Merida — We study the thermal conductivity of five kinds of Magnetic Fluids (MFs) by varying the magnetic material volume fraction and the direction and intensity of an homogeneous magnetic field: The studied MFs are: Magnetorheological fluids (MRF), carbon coated and uncoated Fe nanofluids (CcFeNF, FeNF), ferrofluis (FF); and two kind of composed fluids; ferrofluids loaded with carbon nanotubes (FFCNTs) and ferrofluids loaded with carbon nanofibers (FFCNFs). MRF and FFCNFs fluids increase its thermal transport along the field direction; the thermal enhancement in MRF was dramatically overtaken by the FFCNFs, but in contrast; the rest of the fluids did not present thermal conductivity enhancement under the field. Theoretical models show that thermal resistance at the nanoscale level presents a very important role in the thermal transport among linked particles, this is the reason why FFCNTs, FF, FeNF, and CcFeNF did not present an increase in its thermal conductivity under the action of the magnetic field, although its chain-like structuring. We believe that these experimental finding may have significant application in the area of thermally tailored materials.

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