

## **Thermal Conductivity of Coated and Uncoated Ferromagnetic Nanoparticles Based Fluids Under Homogeneous Magnetic Fields**

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The thermal characterization of carbon coated and uncoated Fe and Ni nanoparticles in a liquid matrix is performed. The analyses were performed varying the volume fraction and the intensity and direction of an externally applied homogeneous magnetic field. Thermal diffusivity is determined using a thermal-wave cavity. In this technique, a fixed frequency modulated laser beam impinges onto a metallic film that heats the sample periodically. The generated thermal wave, travels through the sample until it reaches a pyroelectric sensor placed at the bottom of the cavity instrument. The experiments are performed varying the thickness of the cavity and as a consequence the pyroelectric signal shows an exponential decay. From this data it is possible to determine the thermal diffusivity of a liquid sample. The liquid mixture samples were analyzed when they are inside a magnetic field from 0 to 600 Gauss. This field induces a chain-like structure formed by the magnetic interactions between the nanoparticles. The experimental data is analyzed using two models, the traditional Bruggeman approach and a modified two level homogenization model. In this case the thermal interface resistance of the coating of the particles is considered as well as the alignment of the particles due to the field.