

## **Thermal Properties of Magnetorheological Fluids with Dispersed Carbon Nanofibers**

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Magnetorheological (MR) fluids are dispersions of, highly magnetizable, carbonyl iron powder in a non-magnetic carrier liquid. These are materials that in the absence of magnetic fields behave as conventional fluid. Nevertheless, in the presence of a magnetic field, those fluids can be transformed rapidly from a fluid-like state to a solid-like state, due to the preferential aggregation of the microparticles which lead to the formation of chain-like structures in the direction of the applied field. This is considered to be one of the most important characteristic of those smart fluids. The research about thermal properties of this kind of fluids shows that the thermal conductivity could be enhanced with the increment of microparticles concentration and applying an external magnetic field. However, MR fluids based on microparticles are subjected to challenges in practical applications due to the lack of versatility. In recent years several studies have been carried out to understand how additives such as carbon nanostructures change the materials properties. In this work we investigated MR fluids loaded with carbon nanofibers, which are nanostructures with a high thermal conductivity, with the goal of enhancing the thermal properties of conventional MR fluids. The versatile and accurate technique known as thermal wave resonator cavity technique was used to the measurement of the thermal diffusivity applying a uniform magnetic field. From these results, the thermal conductivity was studied in function of the carbon nanofibers/carbonyl iron microparticles and the applied magnetic field. The results show that using nanostructured materials as dispersal phases can improve the thermal MR performance.