

Characteristics of Magnetic and MR Fluids Flows

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Abstract—A magnetic fluid is a stable suspension of solid magnetic particles whose diameter is 5 -15 nm. The particles are coated with a layer of surfactant which inhibits their coalescence, that is, the magnetic fluid is a stable colloidal dispersion of rather small surfactant-coated magnetic particles in a liquid carrier. When a magnetic field is applied to a magnetic fluid, the magnetic particles in the fluid tend to remain rigidly aligned with the orientation of the magnetic field, and several interesting characteristics have been observed. Magneto-rheological (MR) fluids have similar tendency to magnetic fluids. But MR fluids are formed by magnetizable micron- size particles suspended in a nonmagnetic fluid. When an external magnetic field is applied, the particles aggregate forming columnar clusters aligned in the magnetic field direction. MR fluids usually show yield stress strongly depending on the amplitude of the external magnetic field.

The authors have been investigated flow characteristics of magnetic and MR fluids. In the present study, the author would like to show you some interesting results of these fluids.

Keywords—*Magnetic fluid, MR fluid, Ultrasonic propagation, Micro-gravity, Damping effect, Clusters*

BACKGROUND

Academic history

1. Ph.D. Mechanical Engineering, Keio University, March 1983.
2. Department of Mechanical Engineering, Keio University, April 1983 to present.
3. Visiting Scientist, Institute of Aerodynamics, RWTH Aachen University, October 1988 to September 1989.
4. Visiting Professor, Institute of Fluid Science, Tohoku University, April 2003 to September 2003.

RECENT PUBLICATION

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