

Rotating Ferrofluid Drops

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We study the stationary shapes and the rotational motion of drops of magnetic fluids floating in a non-magnetic liquid of equal density and spun up by an externally applied rotating magnetic field. For a sufficiently large magnetic susceptibility of the drop fluid transitions to non axial-symmetric shapes take place when the field amplitude is increased. We give a detailed theoretical account of the character of these shape bifurcations, of the resulting stationary drop forms, and of the slow rotational motion of the drop and compare our findings with results obtained in an experimental realization of the system. Quantitative agreement between theory and experiment can be obtained when saturation effects in the magnetization curve of the ferrofluid are taken into account.

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