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Motion and deformation of a hydrophobic ferrofluid droplet in a viscous medium under non-uniform magnetic fields SHAHRIAR AFKHAMI, YURIKO RENARDY, MICHAEL RENARDY, Virginia Tech, TIM ST. PIERRE, The University of Western Australia, JUDY S. RIFFLE, Virginia Tech — Recent interest in ferrofluids has been motivated by biomedical and pharmaceutical applications. We numerically investigate dynamics of a hydrophobic ferrofluid droplet placed in a viscous medium under non-uniform magnetic fields. The drop deforms in response to the applied non-uniform magnetic field, and this in turn affects the motion of the ferrofluid droplet. Droplet properties such as interfacial tension, viscosity, magnetic permeability as well as its size and shape can be optimized for the efficient manipulation of the motion of drop through a viscous medium. By computationally measuring the migration velocity of ferrofluid droplets, it is possible to determine the ferrofluid “magnetophoretic mobility”, which is an important characteristic for the feasibility of biomedical applications.

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