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Falling ball viscometry of magnetized ferrofluids[1] ALEX CALI, Montclair State University, W.K. LEE, Advanced Photon Source, Argonne National Laboratory, SAMUEL NUNEZ JR., JOY PRESCOD, ROSE SMITH, A.D. TRUBATCH, MATTHEW VIEIRA, PHILIP YECKO, Montclair State University
— Falling spheres of 500 μm were used to perform viscometric experiments on magnetized ferrofluids. The role of the angle of orientation of an applied unifom field relative to the direction of fall has been examined with high speed phase contrast imaging using the Advanced Photon Source. The magnetized ferrofluid exhibits an anisotropic viscosity that we can quantify in terms of a tensorial viscosity coefficient. We find that the effective drag is greater when the fall occurs normal to the applied field rather than parallel to it, a result that is opposite to what is predicted by many ferrofluid magnetoviscosity models, but consistent with the properties of electro- and magneto-rheological fluid, liquid crystal, and polymer fluid rheology models. Finally, we discuss the dispersion of these results in terms of thread-like aggregations of magnetic particles observed in the experiments.

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