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Morphological dynamics of a falling drop in a magnetic field DAVID S. MARTÍNEZ, PhD. Student, Technical University of Cartagena, MIGUEL ANGEL CABRERIZO-VILCHEZ, University of Granada, ANTONIO VIEDMA, Professor, Technical University of Cartagena, ALIDAD AMIRFAZLI, Professor, Department of Mechanical Engineering — A ferrofluid drop was released and fell through the air; as it travelled through a thin coil a magnetic pulse (4-65 mT for 4 ms) was given. The drop either deformed or split into a multitude of smaller particles. For pulse amplitudes less than 9 mT the drop sequentially deformed to oblate and prolate ellipsoids; the dynamics of drop deformation in this case was modeled using a harmonic damped oscillatory function. Higher magnetic field pulse amplitudes resulted in drop taking the form of a cylindrical ligament; depending on the field strength various numbers of drops were ejected from ends of the ligament. The size of ejected drops decreased with increasing magnetic field strength. Ejected drops travelled with higher velocities as magnetic field strength was increased in a linear fashion. At field strengths of 65mT up to six drops were ejected from the ligament. Ejected drops where all spherical, and the ejection process was over in 22 ms. The cylindrical ligament eventually recovered to a spherical shape due to surface tension forces in 210 ms. Other interesting observations such as momentary interactions without coalescence between consecutive drops due to the wake effect will be discussed.

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