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Influencing the In-flight Shape and Velocity of a Ferrofluid Drop by a Magnetic Field: Case of a Falling Drop Towards a Surface ALIDAD AMIRFAZLI, J.N. WU, University of Alberta, MIGUEL CABRERIZO-VILCHEZ, University of Granada — In this work magnetic field generated either by a solenoid or a permanent magnet was used to manipulate and change the shape of a drop approaching a surface. The magnetic field was also used to change the velocity of the drop approaching the surface. The capability to sculpt the drop shape and change its velocity opens up new ways of manipulating drop impact onto a surface, which can be interesting for printing industry, especially 3D printing for manufacturing parts. EFH1 (Ferrotec, USA), a colloidal dispersion of magnetite in an oil, was used as the ferrofluid, and its drops were generated with a size of $\sim$2.4 mm using a dispensing system. High speed imaging and image processing were the primary tools for this study allowing data acquisition, and analysis, respectively. Results showed that the in-flight drop shape can be changed from spherical (no field applied) to mildly elliptical or even cylindrical depending on the method of magnetic field generation, the strength of the magnetic field, and the duration of application of the magnetic field (when solenoid was used). Drop velocities could also be increased by up to three times of what would have been possible under free fall condition for a drop. Finally a discussion of in-flight drop breakup as an ultimate way to change the drop shape and its potential for applications will be provided.

Alidad Amirfazli
University of Alberta

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