Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Fast microdroplet impact: a high-detail investigation using novel experimental methods CLAAS VISSER, University of Twente, PHILIPP FROMMHOLD, University of Goettingen, SANDER WILDEMAN, CHAO SUN, DETLEF LOHSE, University of Twente, PHYSICS OF FLUIDS GROUP, UNIVERSITY OF TWENTE TEAM, DRITTES PHYSIKALISCHES INSTITUT, UNIVERSITY OF GOETTINGEN TEAM — Optimization of everyday applications (e.g. diesel engines and spray cleaning) requires full control of high-speed microdroplet impact. However, experimental data in this regime is scant. We present a novel method to visualize impact of droplets with a diameter of 50 micometers on hydrophillic and -phobic surfaces, at frame rates beyond 10Mfps. This allowed us to study in high detail the impact dynamics for velocities up to 50 m/s. In addition, the exact droplet shape during spreading was determined by a bottom-view interferometry technique. The study was complemented with numerical simulations, providing a complete and detailed picture of the 3D-flow field during impact. The physics of microdroplet spreading are scale-independent (they are governed by the Weber- and Reynolds numbers alone). This allows to describe and optimize the impact of droplets in a range of industrial applications.

Claas Visser
University of Twente

Date submitted: 24 Jul 2013 Electronic form version 1.4