Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Freezing-damped drop impacts VIRGILE THIEVENAZ, THOMAS SEON, Sorbonne Universite & CNRS, Institut d'Alembert, Paris, France, CHRISTOPHE JOSSERAND, Ecole Polytechnique & CNRS, LadHyX, Paris, France — We experimentally investigate the effect of freezing on the spreading of a water drop. Whenever such a drop impacts a cold surface whose temperature is lower than 0 C a thin layer of ice freezes during the spreading. This freezing has a notable effect on the impact: at given Reynolds and Weber numbers, we show that lowering the surface temperature reduces the drop's maximal extent, together with the spreading duration. Using an analogy between this ice layer and the viscous boundary layer which also grows during the spreading, we are able to model the effect of freezing as an effective viscosity. The scaling laws designed for viscous drop impact can therefore be applied to such a solidification problem, avoiding the recourse to a full and complex modelling of the thermal dynamics.

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Date submitted: 30 Jul 2019 Electronic form version 1.4