Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Breakup of a thin drop under a stagnation point flow ALIREZA HOOSHANGINEJAD, SUNGYON LEE, Department of Mechanical Engineering, University of Minnesota, MICHAEL SHELLEY, Applied Mathematics Laboratory, Courant Institute, New York University — Recent studies by Hooshanginejad and Lee (2017) have demonstrated complex depinning behaviors of a partially wetting droplet under wind. Motivated by this study, we examine the coupled evolution of a 2D thin drop and external wind, when it is initially held against a fast stagnation point flow. Our drop lubrication model employs the potential flow and Prandtl boundary layer theory for outer flow to compute the internal drop flow corresponding to drop deformations. Furthermore, both the analytical and numerical steady state solutions provide a partial prediction for the drops final shape and help identify the range of droplet sizes that undergo a breakup for the given flow condition.

Sungyon Lee
Department of Mechanical Engineering, University of Minnesota

Date submitted: 31 Jul 2017 Electronic form version 1.4