Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

A regularised one-dimensional drop formation and coalescence model on a single Eulerian grid THEO DRIESSEN, University of Twente, ROGER JEURISSEN, Eindhoven University of Technology, HERMAN WIJSHOFF, OCE Technologies NV, ARJAN VAN DER BOS, JACCO SNOEIJER, DETLEF LOHSE, University of Twente — Droplets with a well-controlled size and speed are required in many industrial and medical applications. In this work we study axisymmetric droplet formation from a piezo inkjet print head. The breakup of an axisymmetric viscous jet is considered in the lubrication approximation. The discretised equations are solved on a fixed equidistant one-dimensional Eulerian grid. The governing equations are implemented in a conservative second order accurate total variation diminishing (TVD) scheme, preventing the numerical diffusivity. Singularities that occur at pinchoff and coalescence are regularised by a small modification on the surface tension. The modification is of the order of the spatial step. This regularisation ensures that the solution of the presented numerical model converges to the exact solution of the breakup of a jet in the lubrication approximation. The results of the presented numerical model agree quantitatively with the analytical solution of the Rayleigh-Plateau instability, and with experimental results on the final stage of the Rayleigh-Plateau instability.

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Date submitted: 02 Aug 2011 Electronic form version 1.4