Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Drop deformation between parallel plates PATRICK ANDERSON, PIETER JANSSEN, Eindhoven University of Technology — Studying the nature of flow in confined geometries has become increasingly important due to downsizing of equipment. Examples include microfluidic devices as lab-on-a-chip and flow through porous media. Here, we focus on the flow of a single drop in a matrix fluid confined between two parallel walls, where the distance between the walls is in the order of the drop diameter. To model this system a three-dimensional boundary integral method is used with the inclusion of the two parallel walls in the free-space kernels of the boundary integral method. The deformation of a drop in shear flow as function of the capillary number and the distance between the walls is studied. The drop shapes found in the presence of the walls substantially differ from the typical ellipsoidal shaped drops found in unbounded flows. Overall deformation, expressed in the Taylor deformation parameter, increases when reducing the distance between the walls. Furthermore, the angle of the major drop axis with the velocity direction also decreases. A detailed analysis decribing the dynamics of breakup of drops in confined geometries is discussed.

Patrick Anderson
Eindhoven University of Technology

Date submitted: 03 Aug 2007 Electronic form version 1.4