Drop deformation in shear flow between parallel plates PATRICK
ANDERSON, TUE, PIETER JANSSEN — Studying the nature of flow in confined
geometries has become increasingly important due to downsizing of equipment. Ex-
amples 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 di-
ameter. To model this system a 3-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. Finally,
the effect of an insoluble surfactant is shown on deformation.

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