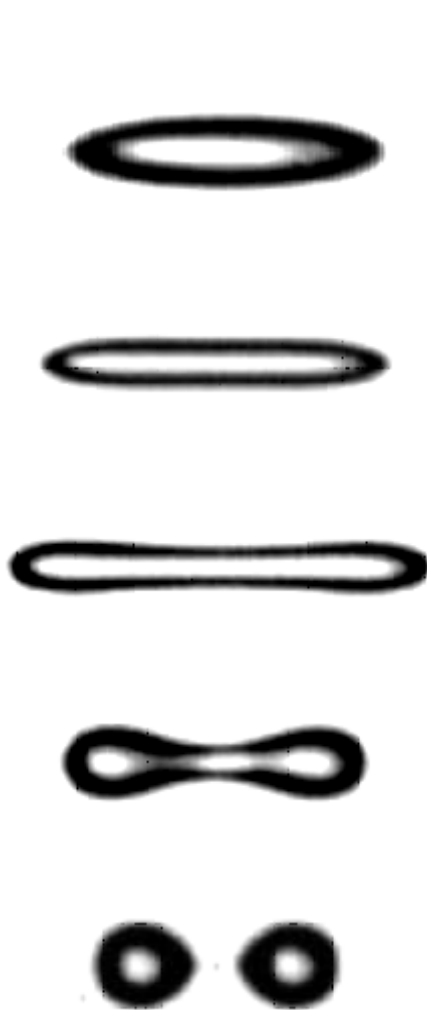


Crowding effect

The experiments are performed in a 'Four Roll Mill' device which produces an axisymmetric extensional flow in a suspending fluid of high viscosity. We study the drainage of the thin film formed between micron sized droplets which are freely suspended in the suspending fluid matrix. The experiments are carried out at low capillary numbers and varying viscosity ratios between the drop and external fluid. Both, the head on collisions and the glancing collisions between the drops can be studied in the four roll mill.



Drop breakup in axisymmetric extensional flow



Glancing collision between two droplets in an axisymmetric extensional flow leading to coalescence

The experimental results are complimented by the numerical solution of a theoretical model based on thin film drainage using a boundary integral technique. The boundary integral method predicts the stability of the thin film and the drainage time at low capillary numbers.

The “crowding effect” is observed when the drops undergoing coalescence are suspended in a swarm of similar-sized drops. The effect of the presence of other drops can be simulated by a suspension of refractive-index matched rigid particles of size comparable to the two drops under observation. The presence of other drops is expected to affect locally, the drainage of the thin film between the drop and on a larger scale, by changing the effective viscosity of the suspending fluid and by introducing fluctuations in the external force acting on the drops.