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Y.W. Stegeman, F.N. vd Vosse, A.K. Chesters, and H.E.H. Meijer
Eindhoven University of Technology,
Department of Mechanical Engineering,
P.O. Box 513, NL 5600 MB Eindhoven

Introduction

For production of low- and nonfat food with proper texture, knowledge of non-Newtonian rheology, coalescence and break-up is essential. The objective of this study is to determine the influence of visco-elastic fluid behavior on the break-up process.

Experimental Methods

Materials

Model fluids with well defined rheological properties are produced, using aqueous solutions of:

- 0 - 50 wt% Newtonian polyethyleneglycol
- 0 - 2 wt% visco-elastic polyethyleneoxide

By varying the composition of these solutions, a large range of viscosities and elasticities is obtained.

Setup

Break-up of the model fluids is induced by the elongational flow in the stagnation point of an opposed jets device, as shown in figure 1.

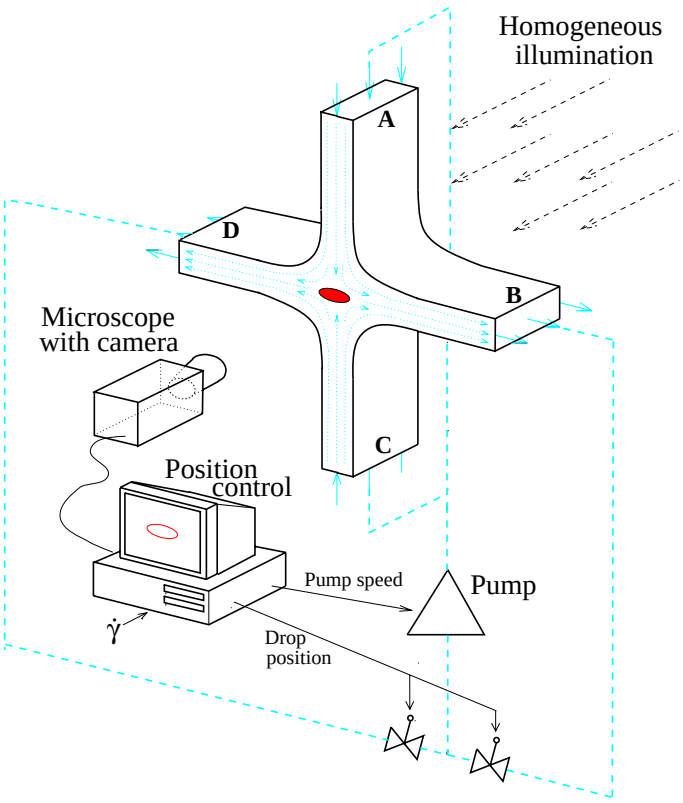
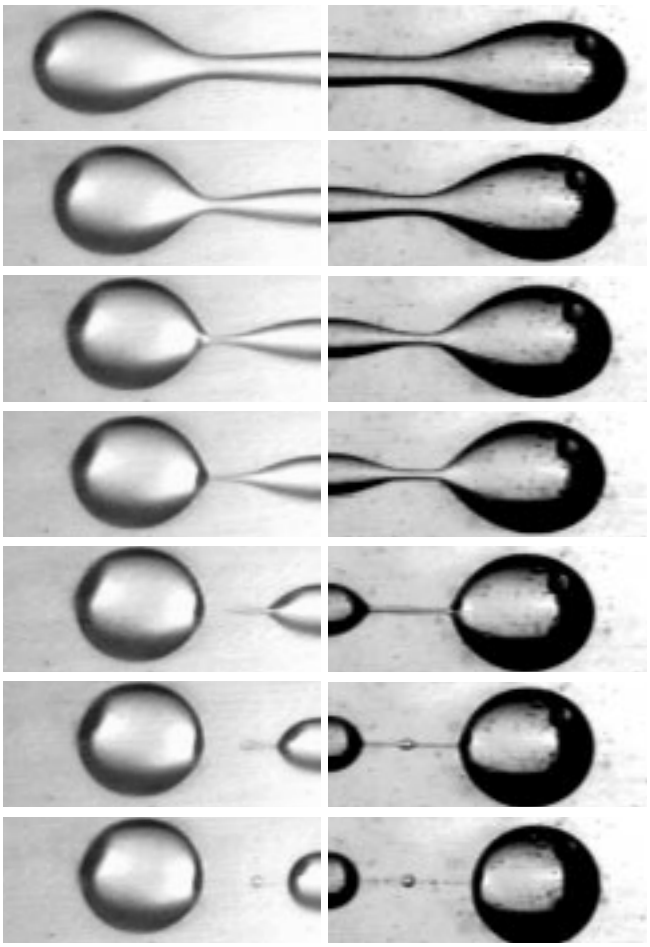


fig. 1 *Opposed jets setup for break-up in elongational flow*

Preliminary Results

The first experiments show a difference between breakup of visco-elastic and Newtonian droplets. In contrast to break-up of Newtonian droplets, the visco-elastic fluid drains into satelite droplets, *without* changing the shape of the filaments (fig. 2).



Newtonian droplet *Visco-elastic droplet*

fig. 2 *Binary break-up in a quiescent Newtonian matrix*

Future Work

- Quantitative determination of the influence of *visco-elasticity* on break-up and coalescence
- Investigation of the break-up and coalescence behavior of *gelling* bio-polymer solutions
- Theoretical or experimental determination of the important parameters in these processes
- Numerical simulations of both processes

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