TECHNISCHE UNIVERSITÄT DRESDEN

HZDR

Fakultät Maschinenwesen Inst. Verfahrenstechnik u. Umwelttechnik, Prof. Transportprozesse an Grenzflächen

Prof. Dr. rer. nat. et Ing. habil.
Kerstin Eckert

Kontakt: Milad Eftekhari
Telefon: 0351 260-3873
E-Mail: m.eftekhari@hzdr.de

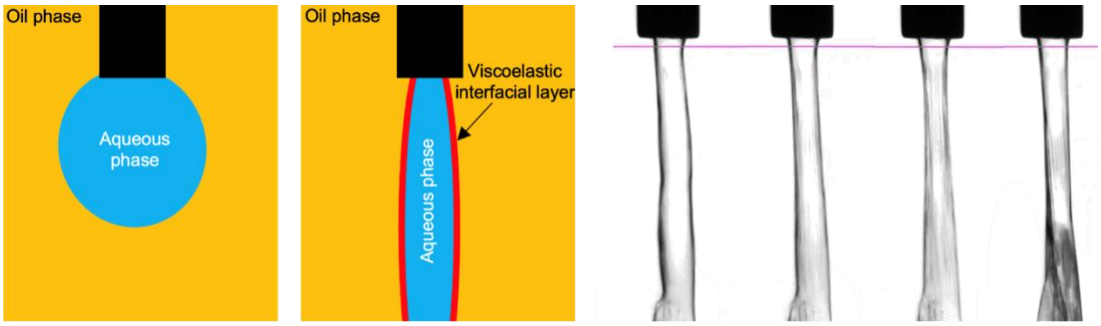
Kontakt: Karin Schwarzenberger
Telefon: 0351 463-36627
E-Mail: karin.schwarzenberger@tu-dresden.de

Influence of interfacial viscoelasticity on the dripping to jetting transition

Master theses / Diploma theses / Compulsory Internship

Liquid jets are unstable and eventually form droplets to minimize the surface energy with the surrounding fluid. The transition from dripping to jetting and dynamics of the droplet pinch-off have been studied extensively for various systems, from pure Newtonian fluids to complex non-Newtonian liquids. The jetting process has received significant attention as it is a critical step in various three-dimensional (3D) printing techniques such as dropwise additive manufacturing and the direct ink writing method. In most of the applications surface active materials such as surfactants, nanoparticles, and polymers exist in the systems. The presence of surface-active materials reduces the liquid-fluid surface energies and in some cases generates a viscoelastic layer at the interface.

In this research, we aim to study the influence of interfacial viscoelasticity on the dripping to jetting transition. The study is conducted by the injection of an aqueous phase (nanoparticle dispersions) into an oil phase that contains surfactants over a wide range of flow rates. We tune the magnitude of interfacial viscoelasticity by changing the concentration of surfactants and nanoparticles.



Research question:

1. Does the dripping to jetting transition (critical flow rate) linearly increase by increasing the interfacial viscoelasticity?

Experiments:

1. Measurements of interfacial tension and surface elasticity for a range of particle and surfactant concentration using Profile analysis tensiometry, and Langmuir trough.
2. Dripping to jetting experiments for the selected systems using high-speed cameras and in-house setups.

Postadresse (Briefe)
TU Dresden, 01062 Dresden
Postadresse (Pakete u.ä.)
TU Dresden
Helmholtzstraße 10
01069 Dresden

Besucheradresse
Sekretariat:
Helmholtzstr. 14
Merkel-Bau
EG, Zi. 17

Internet
https://tu-dresden.de/ing/maschinenwesen/ifvu/tpg
www.hzdr.de