Research on Capillary Hydrodynamics at the Institute of Fluid Mechanics and Heat Transfer (ISW) in Graz

Research Team name: Graz University of Technology, ISW
Presenter name: Günter Brenn

Team Presentation – Annual Workshop, COST Action MP1106
Dublin, September, 2012

Team's general info

Research Team Name: Graz University of Technology, ISW

Number of team members: 17 (including workshop and admin)

Brief description of team:

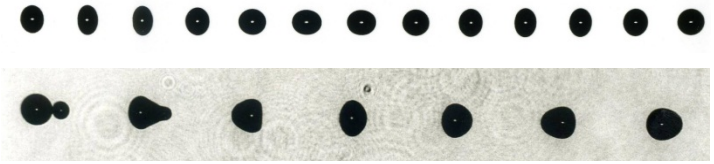
Team leader: Günter Brenn, Aerospace Engineer

- 1 associated professor
- 1 assistant professor
- 4 PhD. students
- 1 MSc. student
- 4 technicians

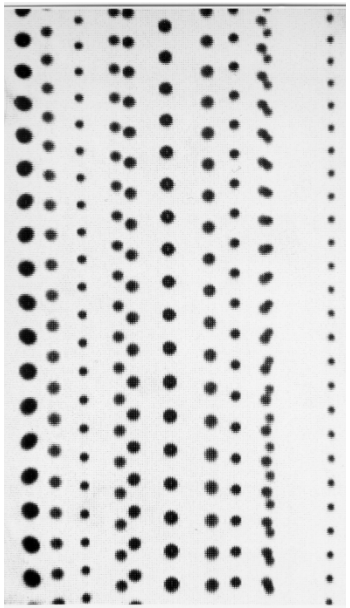
- ❖ 2 Mechanical Engineers
- ❖ 1 Mathematician
- ❖ 1 Chemical Engineer

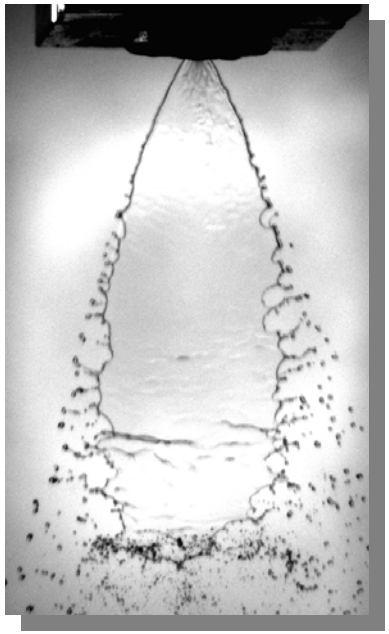
Relevance to MP1106

Research interests related to MP1106:



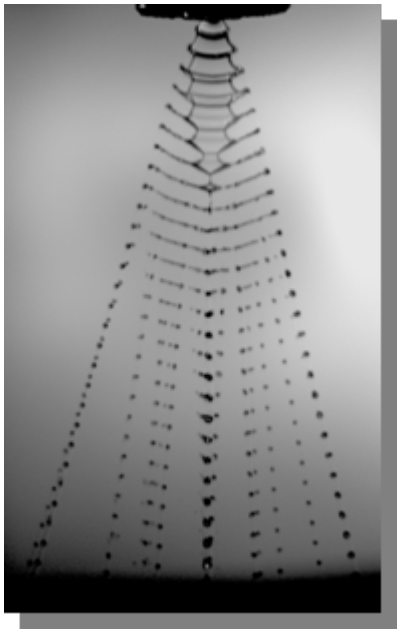
- Stability of capillary systems
- Shape oscillations of drops
- Techniques for controlled spray formation
- Transport across interfaces
- Methods for controlled emulsification





Water
We=1150
d_s=0.4mm

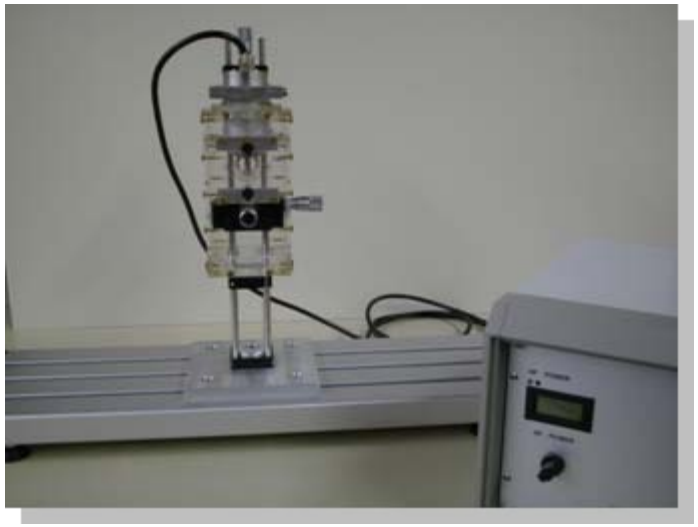
25% wt. Glycerol in water, We=294
d_s=0.4mm
f=5.2kHz
s_0=0.07µm

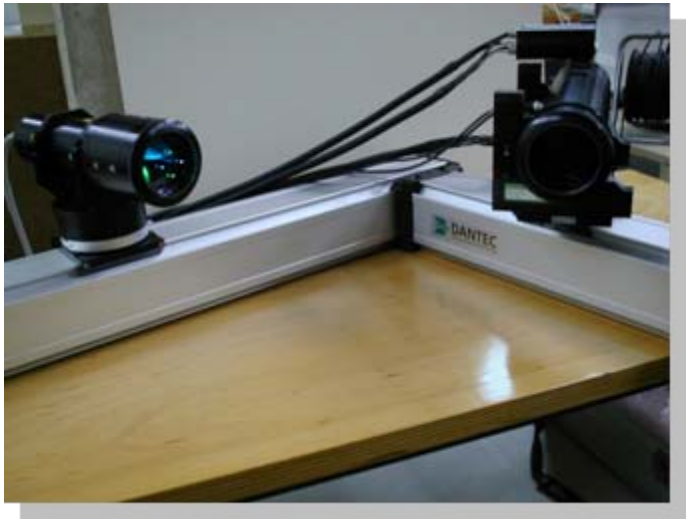


Lab description

Basic facilities, equipment, devices etc:

- Laser-Doppler-based measuring equipment
- Shear viscosimeters (capillary and rotary)
- Elongational rheometers
- Acoustic levitator for single-particle/drop investigations
- Access to the laboratory equipment of the Research Center Pharmaceutical Engineering

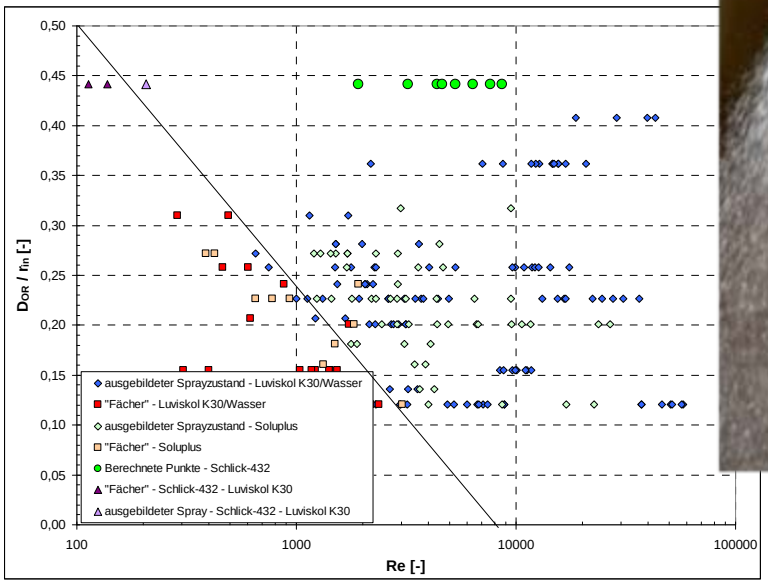


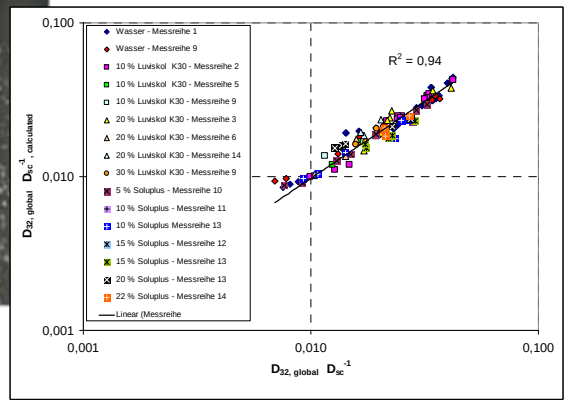


Projects

Project # 1:

Title: Development of a technique for selecting pressure-swirl atomizers appropriate for spraying of polymer solutions
Duration: 3 years
Funding organization: (bilateral project with BASF – The Chemical Company)
People involved and their function: 1 PhD student, 3 technicians
Facilities/equipment: Spray test rig
Most interesting results:

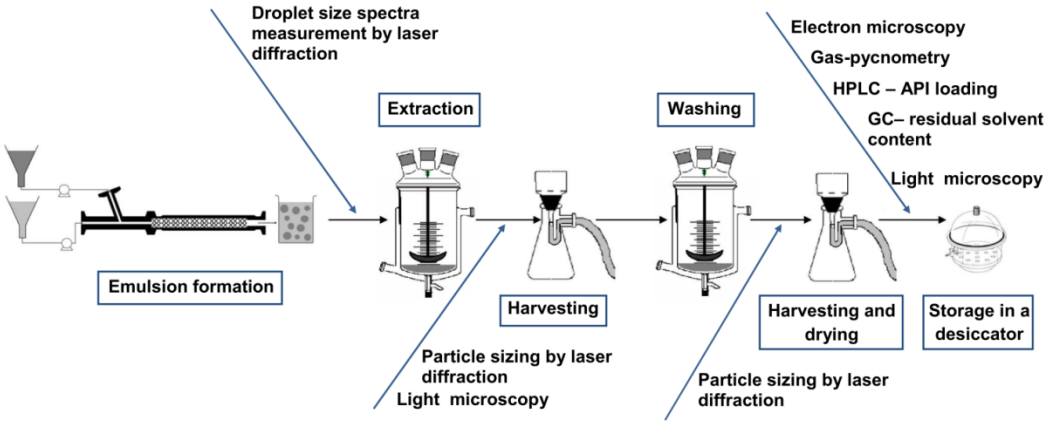




Projects

Project # 2:

Title: Micro-particle formation with the emulsification-extraction method
Duration: 3 years
Funding organization: FFG in Austria in the COMET program (RCPE)
People involved and their function: 1PhD student, 1 lab assistant
Facilities/equipment: Lab equipment of RCPE – from GC, HPLC to diffract. sizer
Most interesting results: Particle properties

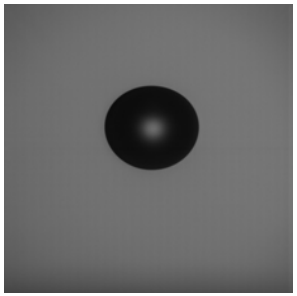


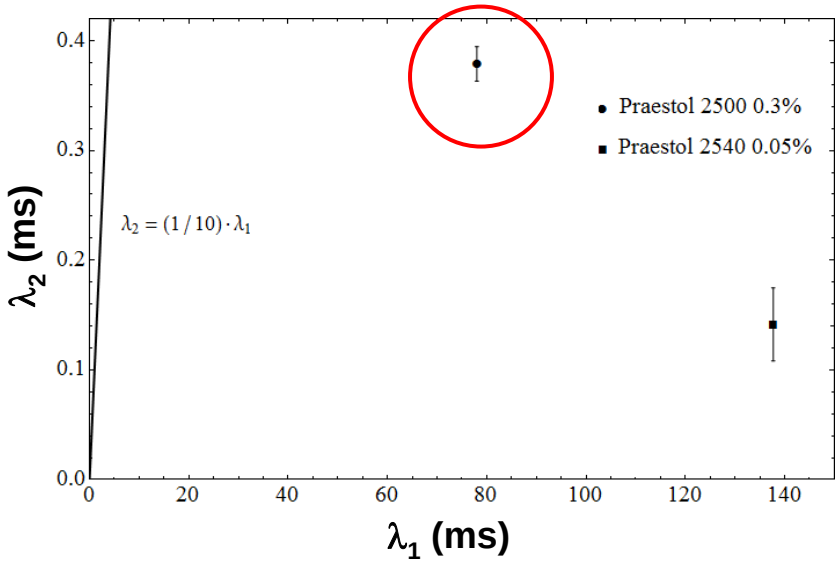
Morphological properties of particles as functions of relevant quantities

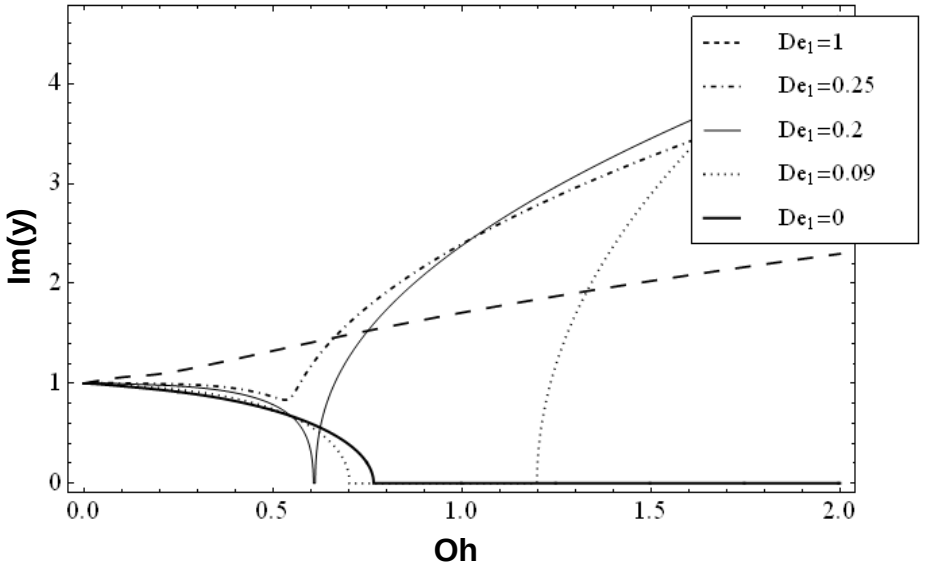
Projects

Project # 3:

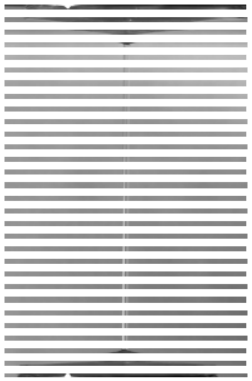
Title: Shape oscillations of viscoelastic drops used for determining the polymer deformation retardation time
Duration: undetermined
Funding organization: None so far
People involved and their function: 1 MSc student
Facilities/equipment: Acoustic levitator, shear rheometer
Most interesting results:







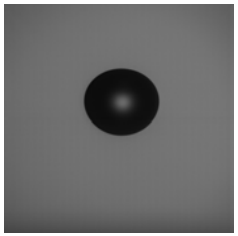
Topics for Research Proposal



#1 Topic

Title: Polymeric time scales in viscoelastic flows

Promotion images & text: Develop techniques based on fluid mechanics for determining polymeric time scales in viscoelastic liquids (elongational rheometry, shear rheometry, drop oscillations)



Duration: 3 years

Expertise required: Polymer physics, polymer chemistry, capillary hydrodynamics

Facilities/equipment required: Rheometry, determination polymer molecular mass, determination polymer conformation

Topics for Research Proposal

#2 Topic

Title: “Monodisperse” emulsification at high concentrations

Promotion images & text: None

Duration: 3 years

Expertise required: Macromolecular chemistry, physics, capillary hydrodynamics, light scattering

Facilities/equipment required: High-pressure devices (in general emulsification apparatus), drop sizing in liquids at high concentrations, shear rheometry

Thank you for your attention