ELASTOCAPILLARY BUBBLES AND DROPS BETWEEN CIRCULAR FRAMES: SHAPE, FORCE AND STABILITY ANALYSES

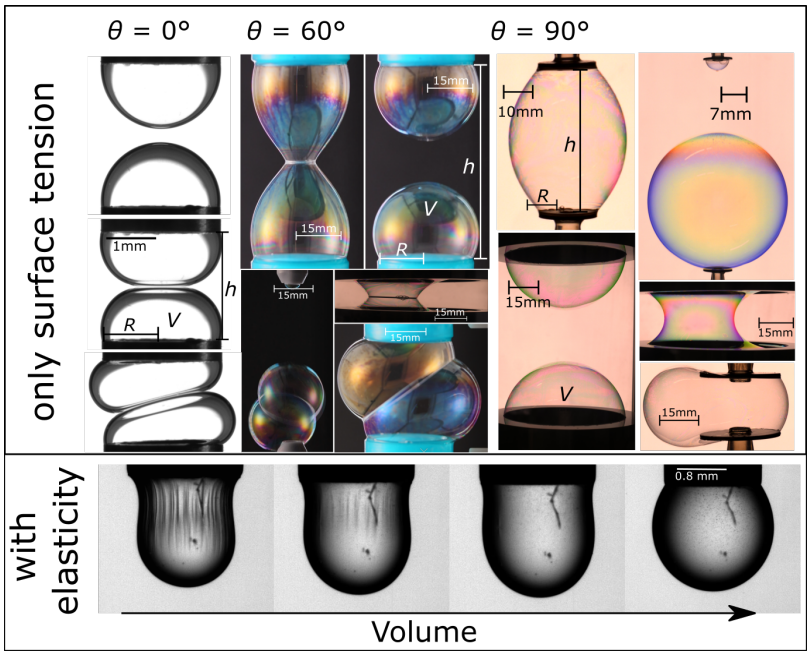
Friedrich Walzel (1), Jonathan Dijoux(1), Leandro Jacomine(1), Pierre Muller(1), Thierry Charitat(1), Wiebke Drenckhan(1)

1. Institut Charles Sadron, Université de Strasbourg, CNRS, 23 rue du Loess, BP 84047 67034 Strasbourg Cedex 2, France

friedrich.walzel@etu.unistra.fr

Interactions between bubbles, drops or capsules play an important role in many physical phenomena and applications. Whether we consider the interaction between two bubbles (drops, capsules) or between many (foams or emulsions), these interactions are complex and still poorly understood. An interesting case arises when two equal- and constant-volume bubbles (drops, capsules) interact with each other while being held by two axisymetrically positioned capillaries of circular cross-section - a configuration which is frequently used in characterisation devices.

The first part of the presentation will consider only bubbles and drops controlled by surface tension. By using experiments, simulations and a theoretical approach, we draw the complex shape spaces which appear by varying the bubble (drop) volume, the capillary radius, the distance between the capillaries and the contact angle between the bubbles (drops). Only with the "simple" case of bubbles (drops) we obtain already 5 different types of shapes, three axisymmetric and two not axisymmetric, see Fig. 1. We analysed the four different shape transitions going from one to another type of shape.



The second part of the presentation deals with a capsule system based on silicon oils and PEG. Starting with characterising the viscoelastic skin properties by using general stress decomposition (GSD), we want to use this system to do similar experiments to investigate the interactions between two capsules.

Figure 1: In the top part different shapes of bubbles and drops are shown. The contact angle between the bubbles (drops) θ the distance between the capillaries h, the volume V and the frame radius R are the control parameters. In the bottom part a series of images of an inflating capsule is shown.