Universität Bremen

CENTER OF
APPLIED SPACE TECHNOLOGY
AND MICROGRAVITY
ZARM

Fluid Dynamics Seminar

Date: Wednesday, April 5th 2017 at 13:00
Location: ZARM, Room 1730

FORMATION, BREAKUP AND COALESCENCE OF DROPLETS

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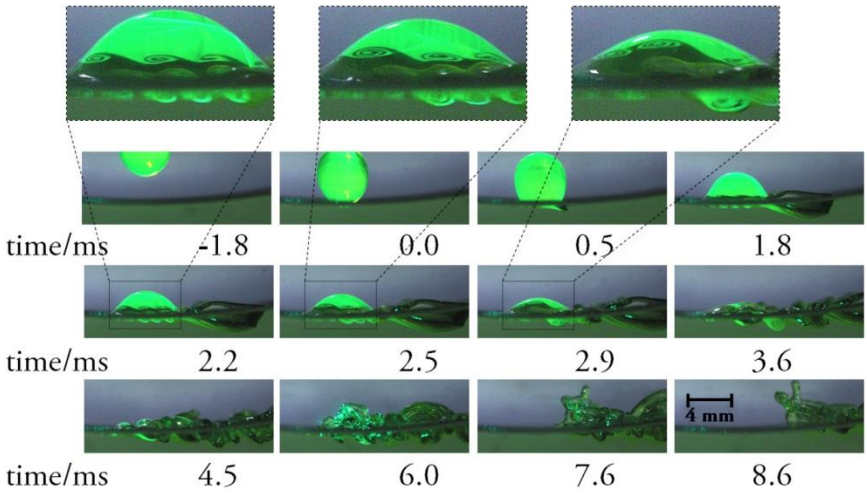

From raindrops landing on the ocean to inkjet printing, drop formation and impact are ubiquitous processes in both nature and industry. It is generally accepted that there is still much to understand about drop breakup and splashing and these topics have gained additional importance motivated by the enormous potential of inkjet, spray and coating technologies in 3D printing. In fact, most methods aiming to model and predict droplet behaviour are either inaccurate or unsuitable for industrial applications. Furthermore, theoretical models are extremely hard to validate, and therefore industry often relies on empirical trial and error testing for product development.

In this talk I will give an overview of my studies that are aiming to bridge the existing gaps between applied and theoretical sciences, and also to an extent, those existing between academic and industrial work in the area of droplet science. The talk will focus on comparisons between experimental data and models and will highlight some interesting phenomena that have been shown recently to be arising in these topics. The first part of the talk will concentrate on the study of the breakup of liquid filaments and drop formation. My results will show that whether a thin filament has a tendency to break up or not into droplets will be dependent only on the liquid properties and the geometry of the system, and that this behaviour is universal. The second part of the talk will focus on the impact, coalescence, mixing and splashing of droplets. While the impact of droplets on to sessile solid substrates has been successfully studied in recent years, the impact on moving liquids has remained vastly unexplored due to practical difficulties. My talk will present the experimental arrangements that will overcome such limitations and will also investigate the impact of droplets on to diverse substrates including moving pools of the same liquid. My results will report the existence of distinct regimes of behaviour that are determined only by the initial dynamic conditions and the properties of the fluid. The third and last part of my presentation will conclude with some suggested directions for future work.