TUAT Fluid Dynamics Seminar

Laser-induced cavitation for needle-free jet injection

Lecturer:

Jelle Schoppink

(PhD Candidate,University of Twente)

Date: Thursday, 30th March, 2023

Time: 14:30 - 15:30 / Place: Building 6 - Room201

Biography

Jelle Schoppink is PhD student at the University of Twente in the Netherlands. He has a bachelor (2016) and master in Applied Physics (2019), with a special focus on fluid physics and soft matter. Since January 2020, he works towards his PhD under supervision of prof. Fernandez Rivas. Using high-speed imaging, he investigates laser-liquid interaction, and the resulting cavitation in a microfluidic device. This is part of a larger multidisciplinary research project, investigating laser-actuated needle-free jet injection.

Abstract

Over the last 15 years, laser-actuated jet injectors have been investigated as an alternative to injection needles. These injectors use a laser to generate a bubble inside a microfluidic channel. This expanding bubble pushes out the remaining liquid, forming a fast microfluidic jet that is able to penetrate the outer layers of skin under certain conditions. To create this bubble, two different lasers can be used: a nanosecond-pulsed, or a low-power continuous-wave laser. Although both of these lasers have been thoroughly used, a direct comparison between these two has never been made. In this talk, I will present our recent work on a comparison of the bubble formation between a low-power continuous-wave and a pulsed laser. This comparison shows that both lasers create similar bubble growth and collapse dynamics, although the bubbles created by the pulsed laser require slightly less optical energy. Furthermore, I will present some of our recent work on selectively coated microchannels and their influence on the jet formation and stability.

Organized by: Prof.Y.Tagawa (tagawayo@cc.tuat.ac.jp)