



TUAT Fluid Dynamics Seminar

Shear rate imaging using a polarization camera and birefringent aqueous cellulose nanocrystal suspensions

Lecturer:

Dr. Connor Piers Lane

Date: Friday, 28th October, 2022

Time: 11:30 - 12:30

Place: Building 6 - Room201



Biography

Connor Lane obtained his B.Sc. and M.Sc. in Mechanical Engineering from ETH Zürich, Switzerland. In October 2022, he finished his doctorate under the supervision of Professor Rösgen at the Institute of Fluid Dynamics at ETH Zürich. His research interests are flow birefringence, photoelasticity, and polarization imaging.

Abstract

A fluid that is composed of anisotropic particles may show birefringence when under the effect of shear. This phenomenon is known as shear induced birefringence and can be used to study and visualize fluid flows. The most common way to measure birefringence is to send polarized light through the birefringent material and to measure the change in polarization. In this seminar I would like to talk about four aspects of flow birefringence measurements. First, we are going to discuss factors influencing the measurement quality of a polarization camera. Second, a two-dimensional birefringence measurement technique that is based on a rotatable linear polarizer and a polarization camera is presented. Third, birefringence measurements of aqueous cellulose nanocrystal suspensions are discussed. Finally, I argue that the study of shear rates in a two-dimensional shearing flow by means of flow birefringence is feasible and therefore encourage the use of aqueous CNC suspensions for birefringent flow studies.

