

INVESTIGATION OF COMPLEX FLOW PATTERNS IN A MOVING IMMERSION LENS DROPLET (CONTACT LINE CONTROL DURING WETTING & DEWETTING)

PROJECT LEADERS

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RESEARCH THEME

Complex dynamics of fluids

PARTICIPANTS

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COOPERATIONS

ASML, UT, TU/e

FUNDED

FOM

1st - 2nd 50% 3rd 50%

START OF THE PROJECT

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INFORMATION

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PROJECT AIM

This project aims to visualize and investigate the complex flow patterns that occur in a confined Couette flow that resembles a moving droplet of an immersion lens geometry, and to understand how this interacts with the dynamics of the moving contact line. We will make use of the newly developed stereoscopic micro particle image velocimetry (2D-PIV), as well as numerical simulations to gain a better understanding of the various flow patterns that occur at intermediate flow Reynolds numbers. The results should lead to strategies that can achieve flow control and to optimized design of a moving immersion lens.

PROGRESS

The aim of the first year of this research is used to construct the experimental facility and to perform first measurements. First of all, we concentrated on installing the experimental facilities in the meanwhile. And, in order to execute an accurate research our experimental facility is well defined and examined by elaborating inspections and cooperating ASML company, for instance the optical system, boundary conditions of the problem, experimental uncertainties and so on. Hence, for applying the particle image velocimetry to measure quantitative measurements of the flow field inside the droplet we are trying to approach several methods, i.e, 2D-PIV, PTV and so on. Hence, we obtained the 1st two dimensional particle image velocimetry measurements with our own set-up. This result show that our set-up is possible to measure the PIV results of the running droplet under high Reynolds number. Moreover, Hyoungsoo Kim find out that through understanding the physical force balances on the rear of the moving droplet the droplet can be protected from losing the liquid under high speed moving boundary system.

DISSERTATIONS

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SCIENTIFIC PUBLICATIONS

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