IMTEK — universität freiburg

# Dynamic Liquid Optics

## PhD project in the Laboratory for Micro-optics

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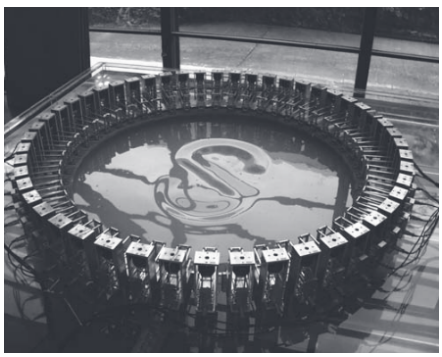
The Laboratory for Micro-optics is one of the world's leading research groups using liquids to make advanced tunable optics. These fluidic systems rely on the ability to controllably deform liquid interfaces into a desired shape for a refractive surface. Using this technology, tunable liquid lenses, prisms, and scanners have been demonstrated, and recently it has even been shown that surfaces with controlled optical aberrations may be generated.

Yet the capabilities of liquid optics for realizing advanced imaging systems can be extended further, and this project will attempt to demonstrate an entirely new means for controllably generating arbitrary liquid surface profiles, namely through time-varying surface waves in the lens. If this works, we will have a unique means for defining free-form optical surfaces in liquid micro-lenses.

Using the unique actuation properties of the 32-electrode tubular lenses developed by our group, the possibility of generating precisely-controlled traveling and standing waves across the lens aperture will be analyzed theoretically and experimentally. It is expected that such dynamic surface waves can be used to generate a wide variety of surface features, also non-circularly-symmetric ones, which cannot be achieved using static actuation.

We are looking for an energetic, creative and committed PhD student to attack this challenge starting in April 2025. Your background should include an MSc degree in engineering or physics, with experience in optics, fluidics or control being a decided asset. We offer a diverse and dynamic research group, edge-of-the-art technology and an exciting academic environment.

Intrigued? Send email to `zappe@imtek.uni-freiburg.de`.



A 1.6 m diameter water-filled wave tank with 50 actuators generating an "S" using dynamic surface waves, designed and fabricated at Osaka University in Japan. Your job: make it 320 times smaller.