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Marangoni effects on coating, spreading and mixing

Abstract:
The surface tension of liquid is a physical property at the liquid interface, which results from the attraction of liquid molecules each other along the air-liquid interface. The surface tension could be altered by temperature, solute, and surfactant. This effect has been extensively studying since the 19th century. Although the Marangoni effects are used for various applications in nature and technology, there are still some missing puzzles to understand the mechanisms.

In this talk, I will present a series of new features of Marangoni effects on coating, spreading and mixing. The problems are investigated using flow visualization techniques, which enable discoveries that are key to puzzling questions in fluid dynamics. The examples include that (i) spontaneous sequential Marangoni instabilities and surface-adsorbable macromolecules for uniform coatings inspired by the drying of whisky and (ii) a finite spreading and mixing of fully miscible liquids. These problems characterize my approach of using optical measurement techniques to explore new questions in multiphase flows and physico-chemical hydrodynamics.

Bio:
Dr. Hyoungsoo Kim is currently an assistant professor in KAIST. He is dedicated to perform flow visualization techniques to investigate the fundamental hydrodynamic instabilities and drying and mixing of complex fluids. Dr. Kim received a B.S. in Mechanical Engineering from Kumoh National Institute of Technology, KOR (2006), a M.S. in Mechanical Engineering from KAIST (Supervisor: Professor Jae Min Hyun), KOR (2008), and a Ph.D. in Fluid mechanics division from Delft University of Technology (Supervisor: Professor Jerry Westerweel), NL (2013). In 2012, he shortly worked with Professor Ho-Young Kim at Seoul National University as a Post-Doc. He spent 4 years for a Post-Doc and research scientist at Princeton University (2013-2016) to work with Prof. Howard Stone.

Faculty Host: Professor Steven Wereley. If you would like to meet Dr. Kim please contact secretary Maggie Hao at hao41@purdue.edu to see if we can accommodate your request within his schedule.