

Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Experimental studies of a volatile simple fluid subject to a horizontal temperature gradient¹ YAOFA LI, BENJAMIN CHAN, MINAMI YODA, Georgia Institute of Technology — Our fundamental understanding of transport in a nonisothermal liquid layer in the presence of evaporation and condensation is limited. Particle-image velocimetry (PIV) was used to measure 2D-2C liquid-phase velocity fields in layers of water and low-viscosity volatile silicone oil with an average depth of a few mm subject to a temperature difference of about 10 ° C over a horizontal distance of ~ 5 cm. Two-color laser-induced fluorescence was also used to measure liquid-phase temperature fields in water. The liquid layers, which were confined in a 1 cm deep rectangular test cell, were studied under both ambient air and in equilibrium with their vapor. Given that thermocapillarity due to the changes in temperature associated with phase change at the free surface can be significant in these flows, results for water, and water with surfactant concentrations below and above the critical micellar concentration are compared. The experimental data for both fluids are also compared with numerical simulations.

¹Supported by ONR.

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Date submitted: 08 Aug 2012

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