

Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Fluid pumping in thin films using thermal waves ALEXANDER ALEXEEV, Georgia Institute of Technology, Atlanta, GA, 30332, USA, WENBIN MAO, Georgia Institute of Technology, ALEXANDER ORON, Technion-Israel Institute of Technology, Haifa, 32000, Israel — Open microfluidic devices are used in many applications, including bio-sensing, molecule manipulation, and microchip cooling. We use direct numerical simulations of the full continuity, Navier-Stokes, and energy equations along with the analysis based on the long-wave theory to examine the dynamics of thin films on substrates with periodic heating that propagates in form of thermal waves along the substrate. Using these two modeling techniques, we probe how the periodic thermal wave can be harnessed to induce and regulate directed fluid flows along the substrate. Furthermore, we study the stability of these solutions to identify the parameter range providing robust fluid pumping in open microfluidic systems.

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Date submitted: 03 Aug 2012

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