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Weakly Nonlinear Analysis and Chaotic Growth in Nanofilm Flows Directed by Thermocapillary Forces CHENGZHE ZHOU, SANDRA M. TROIAN, California Institute of Technology, MC 128-95, Pasadena, CA 91125 — We examine the nonlinear response of nanofilm flows subject to interface deformation and patterned growth by thermocapillary and capillary forces. The governing interface evolution equation describes growth induced by an initial uniform and tranverse thermal gradient in the long wavelength limit.[1,2] A bifurcation analysis via the method of multiple scales elucidates the influence of initial conditions, system geometry and material properties on the regions of stable and unstable flow. Investigation of the corresponding Ginzburg-Landau amplitude equation by finite element simulations reveals the existence of interesting spatiotemporal chaotic behavior during the later stages of patterned growth. Time permitting, we will discuss the possibility of tightly ordered symmetric growth by mode locking to spatially periodic external forcing,[3] in analogy to behavior recently reported for the spatially forced Swift-Hohenberg equation in 1- and 2- dimensions.[4]

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