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Bifurcation, thin film structure and collapse in Newton's bucket[1]
SHOMEEK MUKHOPADHYAY, University of California, Riverside, JOSHUA DIJKSMAN, Physics Department, Duke University, TOM WITELSKI, Mathematics Department, Duke University, RICHARD MCLAUGHLIN, ROBERTO CAMASSA, Mathematics Department,University of North Carolina- Chapel Hill, BOB BEHRINGER, Physics Department, Duke University — The understanding of rotating thin film flows is of great fundamental and practical (spin coating, geophysical flows) importance. In this talk we will present our ongoing work with the second generation of a spin coating apparatus that we call "Newton's bucket," extending on previous work [Mukhopadhyay and Behringer (J. Phys, 2009) and Mukhopadhyay et. al. (Phys. Rev. E, 2011)]. We study the bifurcation of the 'non-classical' dry spot that develops above a critical rotation rate. We observe a nontrivial fine structure in the contact line that connects the dry spot with the fluid reservoir and measure the collapse dynamics of the fluid reservoir by means of high speed imaging. We compare our observations to numerical solutions of the lubrication approximation.

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Shomeek Mukhopadhyay
University of California, Riverside

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