Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Control of three-dimensional waves on thin liquid films. II – Point actuated control SUSANA GOMES, RUBEN TOMLIN, GREG PAVLIOTIS, DEMETRIOS PAPAGEORGIOU, Imperial College London — We consider the application of point actuated blowing and suction controls in the two-dimensional Kuramoto—Sivashinsky equation; this is a weakly nonlinear model for interfacial waves of three-dimensional thin films on inclined flat surfaces. The flow is driven by gravity, and is allowed to be overlying or hanging the flat substrate. In this talk, the controls are modelled using Dirac delta functions. We first study the case of proportional control, where the actuation at a point depends on the local interface height alone. Here, we study the influence of control strength and number/location of actuators on the possible stabilization of the zero solution. For hanging films, we observe that there are critical parameters above which we obtain bounded solutions, and in general there is another set of critical parameters above which the zero solution is stabilized exponentially. We also consider the full feedback problem, which assumes that we can observe the full interface and allow communication between actuators. Using these controls we can obtain exponential stability where proportional controls fail, and stabilize non-trivial solutions.

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Date submitted: 31 Jul 2017 Electronic form version 1.4