Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Controlling Spatiotemporal Chaos in Active Dissipative-Dispersive Nonlinear Systems SUSANA GOMES, Department of Mathematics, Imperial College London, MARC PRADAS, Department of Mathematics and Statistics, The Open University, SERAFIM KALLIADASIS, Department of Chemical Engineering, Imperial College London, DEMETRIOS PAPAGEORGIOU, GRIGORIOS PAVLIOTIS, Department of Mathematics, Imperial College London — We present a novel generic methodology for the stabilization and control of infinite-dimensional dynamical systems exhibiting low-dimensional spatiotemporal chaos. The methodology is exemplified with the generalized Kuramoto-Sivashinsky equation, the simplest possible prototype that retains that fundamental elements of any nonlinear process involving wave evolution. The equation is applicable on a wide variety of systems including falling liquid films and plasma waves with dispersion due to finite banana width. We show that applying the appropriate choice of time-dependent feedback controls via blowing and suction, we are able to stabilize and/or control all stable or unstable solutions, including steady solutions, travelling waves and spatiotemporal chaos, but also use the controls obtained to stabilize the solutions to more general long wave models. We acknowledge financial support from Imperial College through a Roth PhD studentship, Engineering and Physical Sciences Research Council of the UK through Grants No. EP/H034587, EP/J009636, EP/K041134, EP/L020564 and EP/L024926 and European Research Council via Advanced Grant No. 247031.

Susana Gomes
Department of Mathematics, Imperial College London

Date submitted: 31 Jul 2015 Electronic form version 1.4