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Feedback control of falling liquid films ALICE THOMPSON, SUSANA GOMES, Imperial College London, DMITRI TSELUIKO, Loughborough University, GRIGORIOS PAVLIOTIS, DEMETRIOS PAPAGEORGIOU, Imperial College London — Falling liquid films become unstable when the Reynolds number increases above a critical value dependent on slope angle. In the unstable regime, the system first exhibits two-dimensional travelling waves, followed eventually by a transition to chaos. For applications such as coating, a flat, smooth film is desired, while for heat and mass transfer purposes, a non-uniform interface is beneficial. Here we discuss the use of feedback control, based on observations of the film thickness, to enhance or suppress the instability. We use two contrasting long wave models to characterise the system dynamics, and investigate robustness to a number of static and dynamic control strategies for control towards uniform or non-uniform target states. We discuss the differences in control strategy required if feedback is to be delivered by the actuation of suction, heating, or time-dependent topography.

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