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Stabilization of Inviscid Vortex Sheets BARTOSZ PROTAS, McMaster Univ, TAKASHI SAKAJO, Kyoto University — In this study we investigate the problem of stabilizing inviscid vortex sheets via feedback control. Such models, expressed in terms of the Birkhoff-Rott equation, are often used to describe the Kevin-Helmholtz instability of shear layers and are known to be strongly unstable to small-scale perturbations. First, we consider the linear stability of a straight vortex sheet in the periodic setting with actuation in the form of an array of point vortices or sources located a certain distance away from the sheet. We establish conditions under which this system is controllable and observable. Next, using methods of the linear control theory, we synthesize a feedback control strategy which stabilizes a straight vortex sheet in the linear regime. Given the poor conditioning of the discretized problem, reliable solution of the resulting algebraic Riccati equation requires the use of high-precision arithmetic. Finally, we demonstrate that this control approach also succeeds in the nonlinear regime, provided the magnitude of the initial perturbation is sufficiently small.

Bartosz Protas
McMaster Univ

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