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Why do inverted-flags flap in a uniform steady flow?[1] JOHN SADER, The University of Melbourne, JULIA COSSÉ, California Institute of Technology, DAEGYOUM KIM, KAIST, BOYU FAN, MORTEZA GHARIB, California Institute of Technology — The dynamics of a cantilevered elastic sheet, with a uniform steady flow impinging on its clamped-end, have been studied widely and provide insight into the stability of flags and biological phenomena. Recent measurements by Kim *et al.* J. Fluid Mech. **736**, R1 (2013) show that reversing the sheet's orientation, with the flow impinging on its free-edge, dramatically alters its dynamics. In this talk, we use a combination of mathematical theory, scaling analysis and measurement to explore the physical mechanisms driving the observed large-amplitude flapping motion of an inverted-flag. Flapping is found to be periodic predominantly, with a transition to chaos as flow speed increases. These findings have implications to leaf motion and other biological processes, such as the dynamics of individual hairs, because they also can present an inverted-flag configuration.

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