

Abstract Submitted
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Effects of morphology on the flapping dynamics of inverted flags¹

BOYU FAN, JULIA COSSE, Caltech, JOHN SADER, University of Melbourne, MORTEZA GHARIB, Caltech — The behavior of inverted flags has received recent attention in the study of the interaction of flexible bodies with fluid flows. It has implications in a variety of natural phenomena, such as the fluttering of leaves in the wind. As opposed to a conventional flag, defined by a fixed leading edge and a free trailing edge, an inverted flag has a free leading edge and a fixed trailing edge. The reversed flow orientation of inverted flags has led to a surprising observation. Over a narrow range of wind speeds, they exhibit a large-amplitude flapping motion that is not present in their conventional counterparts. Our study experimentally investigates the effects of flag morphology on the flapping behavior of inverted flags. Different flags ranging from rectangles to triangles are studied in a wind tunnel to assess the underlying parameters that govern their dynamics. We observe a significant shift in the limit-cycle flapping mode that is a function of flag shape parameters.

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Julia Cosse
Caltech

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