

Abstract Submitted
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Coupled-Mode Flutter of Bending-Bending Type in Highly-Flexible Uniform Airfoils¹ PARIYA POURAZARM, YAHYA MODARRES-SADEGHI, University of Massachusetts Amherst — We study the behavior of a highly flexible uniform airfoil placed in wind both numerically and experimentally. It is shown that for a non-rotating highly-flexible cantilevered airfoil, placed at very small angles of attack (less than 1 degree), the airfoil loses its stability by buckling. For slightly higher angles of attack (more than 1 degree) a coupled-mode flutter in which the first and the second flapwise modes coalesce toward a flutter mode is observed, and thus the observed flutter has a bending-bending nature. The flutter onset and frequency found experimentally matched the numerical predictions. If the same airfoil is forced to rotate about its fixed end, the static deflection decreases and the observed couple-mode flutter becomes of flapwise-torsional type, same as what has already been observed for flutter of rotating wind turbine blades.

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