

Abstract Submitted
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Tumbling dynamics of flexible wings DANIEL TAM, JOHN BUSH, MIT, MICHAEL ROBITAILLE, ARSHAD KUDROLI, Clark University — We are broadly interested in elucidating the role of flexibility in passive flight. In particular, we examine the role of bending on the flight of autorotating winged seedpods through an experimental investigation of tumbling rectangular paper strips freely falling in air. Our results suggest the existence of a critical length above which the wing bends. We develop a theoretical model that demonstrates that this buckling is prompted by inertial forces associated with the tumbling motion, and yields a buckling criterion consistent with that observed. We further develop a reduced model for the flight dynamics of flexible tumbling wings, that illustrates the effect of aeroelastic coupling on flight characteristics and explains experimentally observed variations in the wing's falling speed and range. Other modes of flexible passive flight are discussed as well as biological implications for the dispersal of seed pods.

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