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Shape and trajectory of a tumbling elastic sheet of paper[1] MIKE ROBITAILLE, ARSHAD KUDROLLI, Department of Physics, Clark University, Worcester, MA 01610 — Inspired by wind dispersal of winged seeds and gliders, we study the flight of a tumbling piece of paper to explore the competing effect of inertia, lift, drag, and elasticity on its aerodynamics. Above a critical aspect ratio, a rigid rectangular sheet is well known to exhibit autorotation, leading to a lift force which causes it to drift away from the vertical as it falls through air. Less known is that the fact that the sheet buckles and bends along the axis of rotation when the rigidity of the sheet is reduced. We measure the deflection of the paper as a function of aspect ratio, and find its speed and angle of descent with high speed imaging. We find that the rotation speed is lower when the sheet is bent, than when it is unbent. The sheet deflection increases above a critical aspect ratio reaching a maximum before decreasing. The angle of descent is well described by a simple model balancing the gravitational, lift and drag forces acting on the sheet.

[1]In collaboration with Daniel Tam and John Bush (MIT).

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