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Free fall of a Möbius band. THOMAS LEWEKE, CNRS-IRPHE, Marseille, France, KERRY HOURIGAN, MARK C. THOMPSON, Monash University, Melbourne, Australia — A Möbius band is a 3D surface with the particular feature of having only one side and one edge. A simple geometrical model consists of a circular centerline, and surface elements which are locally tangent to this line and continuously twist around it, completing one half turn going once around the circle. From an aerodynamic perspective, such a Möbius strip presents a profile that is locally a flat plate with an angle of attack smoothly varying between -90 and 90 degrees, and this regardless of the orientation of the object. Clearly a most peculiar bluff body and irresistible to being studied, in this presentation for its free fall trajectory, body motion and wake dynamics. The governing parameters are the Reynolds number based on the width of the band and the average descent speed, the aspect ratio (perimeter / width) and the mass ratio (band density / fluid density). Free-fall experiments were carried out at low Reynolds numbers in a water tank with Möbius bands made of different plastic materials, having aspect ratio 14 and mass ratios of around 1.2. The band is found to rapidly adopt a bluff leading edge orientation and to follow a spiral path with an independent frequency of pitching.

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