

Abstract Submitted
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**Experimental investigation of free falling thin disks. Part II:
Onset of three dimensional motion from zigzag to spiral** CUNBIAO LEE,
College of Engineering, Peking University, HONGJIE ZHONG — The free falling
motion of thin disk with small dimensionless moment of inertia was investigated
experimentally. Transition from two dimensional zigzag motions to three dimen-
sional spiral motions takes place as a consequence of breakup of planar symmetry
flow structures. The counter-rotating vortices behind the disk became asymmetry
induced by the instability of three dimensional disturbances, one of the separation
location moves from the edge to the disk broad surface which induced a new upright
vortex. The oscillation in the direction normal to zigzag plane increases with the
development of instability. Meanwhile, the oscillation of nutation angle vanishes
and reaches a constant value. In addition, we have shown that small moment of
inertia is responsible for growth of disturbances in the third dimension by means of
generalized Kirchhoff equations.

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