

Abstract Submitted
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On the stable hovering of an asymmetric body in oscillatory airflows BIN LIU, Courant Institute, New York University, ANNIE WEATHERS, Department of Physics, New York University, STEPHEN CHILDRESS, Courant Institute, New York University, JUN ZHANG, Department of Physics and Courant Institute, New York University — A free rigid body, built with up-down asymmetry can hover in a vertical oscillatory airflow if the airflow amplitude and frequency exceed certain thresholds. The key to free hovering lies in the difference in drag coefficients as the airflow passes the object in two opposite directions. The hovering motion is surprisingly stable and robust, lasting for thousands of oscillation periods. We describe a series of flow visualizations of vortex shedding by the hovering object, which show how correcting moments restore its orientation, leading to stable hovering. This study may shed light on the stability of the hovering flight of insects.

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