

PROCEEDINGS

Impact of Mass Distribution on Samara Flight

Zhaobang Hou¹, Junduo Zhang², Yunda Li¹, Yongxia Jia² and Weixi Huang^{2,*}

¹Xingjian College, Tsinghua University, Beijing 100084, China

²AML, Department of Engineering Mechanics, Tsinghua University, Beijing 100084, China

*Corresponding Author: Weixi Huang. Email: hwx@tsinghua.edu.cn

ABSTRACT

Samaras represent a unique category of fruits characterized by a seed accompanied by lightweight wing-like appendages that facilitate dispersal. Variations in structure play a crucial role in influencing the flight patterns of these seeds, shaping their reproductive strategies. To explore the mechanisms behind different samara flight behaviors, we developed an effective approach that adjusts mass distribution on a plate to replicate a range of three-dimensional flight patterns. Through this methodology, we experimentally identified and classified four distinct flight modes. Furthermore, numerical analysis of the three-dimensional vortical structures provided deeper insights into the aerodynamics underlying samara-inspired flight. Our findings highlight how specific mass distributions in samaras give rise to diverse flight behaviors, leveraging vortices to enhance seed dispersal. This study offers a novel perspective for the development of biomimetic flying systems.

KEYWORDS

Samara-inspired flight; mass distribution; vortical structures

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