ETH zürich

Institute of Fluid Dynamics
Institute of Energy and Process Engineering

Kolloquium Thermo- und Fluiddynamik

Unveiling Nature's Air Flows from Bats' Drinking Flight and Plant Leaf Interactions

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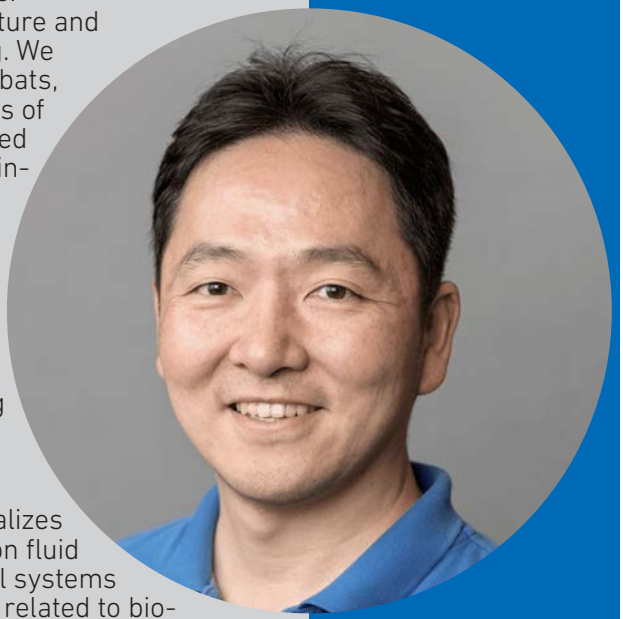
In nature, animals and plants exhibit interesting dynamics in the way they interact with air flows. In this presentation, I will discuss two intriguing examples that highlight how bats or plants disturb the surrounding air flows to achieve specific functions.
Bats exhibit advanced flight abilities due to their skeletal wing structure and flexible membranes. A fascinating behavior is their in-flight drinking. We studied the differences between regular flight and drinking flight in bats, using both experimental and theoretical methods. High-speed videos of two bat species were analyzed in a controlled setting. Results showed bats decrease flapping amplitude and increase frequency during drinking flight. Aerodynamic analyses further explored this behavior by examining lift and drag forces.
Plant leaves, on the other hand, possess the ability to adapt and withstand fluidic stimuli in their natural environment, especially from rain. Rain-induced stresses make leaves twist, bend, and vibrate, aiding in spore and allergen dispersal. Through Lagrangian diagnostics, we have further discovered the presence of hyperbolic and elliptical coherent structures around fluttering leaves, providing a dynamic description of spore transport.



Biosketch:
Dr. Sunghwan (Sunny) Jung, a professor at Cornell University, specializes in fluid mechanics within biological systems. His research focuses on fluid mechanics problems arising from the interaction between biological systems and their physical surroundings. His work also encompasses topics related to bio-inspired engineering applications, taking advantage of physical principles derived from his research findings using dynamical system approaches.

Date: 20 September 2023
Time: 14:00 - 15:15
Place: ETH Zurich, ML F 36
Host: Prof. George Haller

Further information: https://ifd.ethz.ch/events/ktf.html

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