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Session R21: Experimental Techniques: General I
1:50 PM–3:34 PM, Monday, November 20, 2023
Room: 147A

Chair: Shijie Zhong, Johns Hopkins University

Abstract: R21.00007 : From the Field to the Wind Tunnel: Methods for Studying Insect Olfactory Search*
3:08 PM–3:21 PM

← Abstract →

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Mosquitoes utilize scalar cues to find hosts over distances greater than 10 meters. This search behavior is linked to the intermittent plume structure generated by exhaled carbon dioxide in the Atmospheric Boundary Layer (ABL). An understanding of insect olfactory search is relevant to vector control strategies and the design of robotic imitators. Our approach to studying this phenomenon is two-pronged. We conduct field measurements of the ABL at massive scale using an in-house particle tracking system and generate relevant conditions in a wind tunnel using an active grid. The particle tracking system uses high-resolution DSLR cameras to image and track soap bubbles. Soap bubbles have high reflectance, near-neutral buoyancy, and are inexpensive to produce in any environment. These attributes make them attractive seed particles for field experiments. Controlled studies are conducted in a wind tunnel using a custom active grid. The active grid is an array of individually controllable paddles with 76 total degrees of freedom. Imposing correlated motions on the grid generates a range of flow scales, which is key to replicating ABL scalar plumes. This talk will focus on the development and use of these methods.

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