Nature in Motion: Unraveling Locomotion across Mediums and Scales

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3:00 PM
Bowen Hall Room 222
MAE Seminar Series

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Biology and Engineering form an interdisciplinary two-way street. On the one side, natural solutions can inform and inspire mechanical systems' design. This is referred to as bioinspired design. On the other side, referred to as engineering-enabled biology, controlled engineering experimental, numerical, and analytical tools are used and developed to answer fundamental biological questions that would be difficult or even impossible to answer directly using natural systems. This talk will introduce several examples of bioinspired multifunctional structures, such as feather-inspired flow control devices. Flow control devices on birds' wings offer a pathway to advance small aerial vehicles' design and inform flight control for airborne energy harvesters. In addition to bioinspired engineering, I will highlight a few examples of engineering-enabled biology, such as revealing the physics governing the flying fish aerial-aquatic transition and the mechanism that enables click beetles' legless jumping. These research topics represent how nature can inform new locomotion, actuation, and control strategies in mechanical systems and highlight that engineering analysis can provide insights into nature's locomotion and adaptation strategies.

Prof. Aimy Wissa joined the Mechanical and Aerospace Engineering Department at Princeton University as an Assistant Professor in January 2022. She is the director of the Bio-inspired Adaptive Morphology (BAM) Lab. Wissa was a post-doctoral fellow at Stanford University, and she earned her doctoral degree in Aerospace Engineering from the University of Maryland in 2014. Wissa's work focuses on the modeling and experimental evaluation of dynamic and adaptive bioinspired structures and systems, such as avian-inspired and insect-inspired wings, morphing wings, and robotic systems with multiple modes of locomotion. Wissa is a McNair Scholar. She has received numerous awards, including the Air Force Office of Scientific Research Young Investigator and NSF's CAREER awards.

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