Boulder Fluid and Thermal Sciences Seminar Series

Tuesday, February 16, 2016
3:30pm-4:30pm (refreshments at 3:15pm)
Bechtel Collaboratory in the Discovery Learning Center (DLC)
University of Colorado, Boulder

Flight Dynamics and Sensorimotor Feedback at Insect Scales

J. Sean Humbert, *University of Colorado, Boulder*

Insects and other small organisms exhibit incredible agility and robustness in flight, unmatched by today's engineered systems. Their nervous systems have evolved to make useful reductions of sensory-rich and high dimensional data, forming simple representations along with feedback control paradigms that allow organisms to perform well with limited computation in the presence of uncertainty. My laboratory has applied model reduction tools to high fidelity simulations and experiments better understand the aerodynamics and dynamics of flight at these scales as well as control-theoretic tools to understand the sensorimotor feedback principles. This talk will focus on the aerodynamics and flight dynamics modeling efforts and how those reduced order models are being used to provide insight into the potential benefits of the unique sensorimotor architectures in these animals.

Biography: Dr. J. Sean Humbert is the McLagan Family Endowed Associate Professor in the Department of Mechanical Engineering at the University of Colorado, Boulder. He holds a BS degree in Mechanical Engineering from the University of California, Davis, and MS and PhD degrees in Mechanical Engineering from Caltech. He joined CU from the University of Maryland, where he was Associate Director of the MAST-CTA on Microsystem Mechanics, and was the Director of the Autonomous Vehicle Laboratory. Prof. Humbert's research interests are the intersection of dynamics, control, and estimation theory with bio-inspired sensing and locomotion. Recent work has focused on the flight mechanics and distributed sensing and estimation approaches in small-scale organisms. Best paper honors include the AIAA Conference on Guidance, Navigation, and Control, the American Control Conference, and the International Conference on Insect Sensors and Robotics. Dr. Humbert recently won the AIAA National Capital Section Hal Andrews Young Scientist/Engineer Award, and is the recipient of an ARO Young Investigator Award.