



GENERALIZATION OF VORTEX FORMATION TIME TO FLAPPING FLIGHT

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DeWalt Seminar Room
2164 Glenn L. Martin Hall

Speaker

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ABSTRACT

The profound impact of lift force on human travel is mirrored by its vital role in animal locomotion. A recurring feature in animal flight and swimming is a roll-up of free shear layers into swirling vortical structures. During these roll-up processes, animals experience unsteady aerodynamic forces associated with the forming vortex, which can augment the force production. In this talk, I will present flapping flight from the point of view of vortex formation. By considering vorticity flux and maximum circulation in the growing vortex, the dimensionless vortex formation time (inverse of Strouhal number) is generalized. The newly defined dimensionless vortex formation time associated with flight kinematics of wide set of biological flyers fell within a narrow range, pointing to a potentially a strong evolutionary selection pressure to maximize the leading edge vortex circulation.

BIO

Chris Roh received his B.S. in Biological Engineering from Cornell University in 2012 and his M.S. and Ph.D. in Aeronautics from California Institute of Technology in 2013 and 2017, respectively. Chris has been fascinated by the diversity of insects and the different stories each tells. This deep-rooted passion, combined with a more newly found love for intricate fluid flows, led him to study the hydrodynamics of insects at Caltech under the guidance of Professor Morteza Gharib. He is now an Assistant Professor at Cornell University in the Biological and Environmental Engineering department. As the principal investigator of the in vivo Fluid Dynamics Lab, Chris continues to observe 'life in moving fluids' with engineering applications in mind. He is a recipient of the National Science Foundation Graduate Research Fellowship and the Richard B. Chapman Memorial Award.

