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A New Low Reynolds Number Facility for Active Flow Control Applications[1] MATTHEW MUNSON, WILLIAM DICKSON, MORTEZA GHARIB, TIM COLONIUS, California Institute of Technology — In pursuit of integrated closed-loop flow and flight control for stabilization and regulation of vortex formation in separated flows, a new low Reynolds number facility has been designed and installed at the Graduate Aeronautical Laboratories at California Institute of Technology. Observations of insect flight show intriguing high-lift mechanisms that rely heavily on stabilization of leading-edge vortex (LEV) structures. A multi-disciplinary research initiative (MURI) has been formed in order to explore the benefits of understanding and manipulating this LEV stabilization process for micro air vehicle applications. Flow control work at higher Reynolds numbers provides a strong likelihood that mass injection control strategies will be able to strongly influence vortex shedding and result in lift enhancement. This presentation discusses the design features that makes this facility uniquely suited to pursue these investigations. Additionally, preliminary experiments aim to determine the effect of various actuation schemes on the lift characteristics of a low Reynolds number, low aspect-ratio airfoil model.

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