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Computational analysis of a tip vortex structure shed from a bio-inspired blade[1] SEBASTIAN GOMEZ, LINDSAY N. GILKEY, BRYAN E. KAISER, SVETLANA V. POROSEVA, University of New Mexico — Understanding and predicting a tip vortex structure and its dynamics is of significant importance for all branches of aerodynamics. A particular focus of our research is the rotorcraft performance which is substantially influenced by a tip vortex. A tip vortex also is a major source of energy losses and acoustic noise. In the present study, an impact of a blade shape on a tip vortex structure is analyzed. Simulations are conducted of flows around a rectangular blade and a bio-inspired blade of the same area. An insect wing is chosen as a blade prototype. Indeed, insects developed physical characteristics that reduce energy consumption while permitting sustained and controlled flight at low level of noise. Analysis has been done to determine what insect poses flight characteristics closest to the small rotorcraft design goals. Commercial CFD software STAR-CCM+ is used for conducting computations on structured and unstructured grids and for data post-processing.

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