Abstract Submitted
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Three-dimensional flow around a hovering hummingbird[1] JIALEI SONG, HAOXIANG LUO, Vanderbilt University, TYSON HEDRICK, University of North Carolina at Chapel Hill — We use an immersed-boundary method to simulate the complex three-dimensional flow around a hovering hummingbird and study the unsteady vortical structures in the flow. In the simulation, the realistic wing kinematics is reconstructed from high-speed imaging data of a Rufous hummingbird, and thus the wing surface does not assume a two-dimensional plane. The Reynolds number is approximately 3000 based on the average wing-tip velocity and the mean cord length. More than 16 million Cartesian mesh points are used in the simulation, which allows us to capture both near- and far-field vortices. We will show the detailed flow structures in the presentation and will compare the numerical result with previous experimental measurement. In addition, we will discuss the force characteristics and the aerodynamic power of the bird.

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