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Numerical investigation of wake structures of slow-flying bats SHIZHAO WANG, XING ZHANG, GUOWEI HE, Institute of Mechanics, Chinese Academy of Sciences — Recently, some unique features of wake structure in bat flight have been revealed by experiments. It is found that the flow structure of bat flight is more complex than that of bird. A conceptual wake model of bat flight has been "rebuilt" using 2D DPIV images, but there is some risk of missing the details regarding dynamics of 3D vortex structures. Detailed flow information is still needed to understand the unsteady flow in bat flying. In this work, we perform 3D simulation of bat flying at the Reynolds number of 1000 (based on upstream flow and mean chord length) using the immersed boundary method. The geometry and wing-beat kinematics of bat are taken from the work of Watts et al (2001). The topology and evolution of the wake structures are described. The variation of topology in wake structures with the flapping Strouhal number is investigated. Moreover, the link between the generation of high lift and leading edge vortex is also studied.

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