

Abstract Submitted
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Time-resolved measurements of the velocity field over the wing of bats during flight COSIMA SCHUNK, SHARON SWARTZ, KENNETH BREUER, Brown University — Particle Image Velocimetry (PIV) has become a well-established tool to study flows associated with flying animals. The wake shed by flying bats as it is seen in the Trefftz plane is by now well described for several bat species. However, to complete the understanding of the three-dimensional wake structures, additional views are necessary. To meet this need, bats were trained to fly at a stationary position in the wind tunnel at wind speeds between 2 m/s and 6 m/s. Aligning the laser light sheet parallel to the free stream, we measured, using time-resolved PIV (200 Hz), the air flow in the region of the left wing of the animals. Three high-speed cameras (400 Hz) were used to capture the position and movement of the bat and to reconstruct the wing kinematics. Characteristic flow structures were observed consistently at different spanwise positions, including the starting and stopping vortices at the beginning and end of the downstroke, as well as other vortex and wake features.

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