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Wing Kinematics and Wake Velocity Characteristics of Bat Flight SHARON SWARTZ, RICARDO GALVAO, JOSE IRIARTE, EMILY ISRAELI, KEVIN MIDDLETON, ABIGAIL ROEMER, ALLYCE SULLIVAN, XIAODONG TIAN, KENNETH BREUER, Brown University — Bats demonstrate unequalled flight characteristics and are capable of highly efficient flight as well as extreme maneuverability at high speeds. They have morphological properties that are unique in the animal world including jointed wings skeletons, elastic wing membranes and very complex wing motions. We report on a series of experiments on bats flying in a flight cage along both a straight path and through a 90-degree turn. Measurements of their kinematic wing motion (using high speed photography) and wake velocity structures (using stereo PIV) are reported. The live animal measurements are also interpreted with the help of a series of companion wind tunnel experiments using model structures that mimic some key features of bat flight mechanics. The results reveal a complex vortex wake structure which is compared and contrasted to that found in bird and insect flight.

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