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A vorticity-free approach to wake-based swimming/flying force estimation[1] JOHN O. DABIRI, JIFENG PENG, California Institute of Technology
— Traditional wake-based analyses of animal swimming and flying depend largely on knowledge of the vorticity field, which can be difficult or impossible to incorporate in the context of unsteady fluid-structure interactions. This talk will describe the development and application of a technique for estimating swimming/flying forces that does not require measurement of the vorticity field. The method is based on the identification of Lagrangian Coherent Structures in the wake, whose dynamics are governed by the theory for deformable bodies in potential flow (Peng and Dabiri, J. Exp. Biol. 2007). This paradigm for the analysis of unsteady fluid-structure interactions is integrated with existing DPIV measurement techniques to analyze medusan (jellyfish) swimming and the dynamics of the bluegill sunfish pectoral fin.

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