

Abstract Submitted
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Wake Structure and Thrust Production of a Low Aspect Ratio Pitching Panel¹ JAMES BUCHHOLZ, ALEXANDER SMITS, Princeton University — The wake structure and thrust performance of a low aspect ratio panel pitching in a uniform flow is investigated experimentally. The wake undergoes transitions in its structure with variation in nondimensional flapping frequency. At low frequency, the wake represents a three-dimensional von Kármán vortex street. With increasing frequency, the wake divides into two distinct trains of vortical structures spreading in the transverse direction followed by a spanwise thickening of the wake. The fundamental constituent of each of these wake structures is a sequence of horseshoe vortices shed from the trailing edge and adjacent spanwise-oriented edges of the panel. Time evolution and transitions in the wake can be understood in terms of interactions between these horseshoe vortices. A three-dimensional vortex model of the wake will be presented, and the relationship between thrust performance and wake transitions will be discussed.

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James Buchholz
Princeton University

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