

Abstract Submitted
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Shedding characteristics along the span in the wake of a low-aspect-ratio pyramid ZAHRA HOSSEINI, MOUHAMMAD EL HASSAN, ROBERT MARTINUZZI, University of Calgary — The aim of the present work is to extract the 3D vortical structures in the wake of a low-aspect-ratio pyramid to study the cellular shedding patterns and interactions between structures with different scales along the span. The velocity fields measured, using Time Resolved PIV, at 2D planes in the wake shows the formation of anti-symmetric Karman shedding and instances of symmetrically positioned structures that interrupt the shedding. In such instances the Reynolds stresses drop significantly. The coherent vortical structures were extracted using the first three POD modes, the first two composing a harmonic pair and the third a symmetric mode capturing the low frequency modulations. The energy of the third mode is almost constant along the span which can be related to the spanwise coupling of the structures. The energy of the harmonic pair is significantly larger at the base but drops quickly at higher spans and becomes comparable to that of the third mode. In the symmetric configurations, the harmonic pair amplitude drops sharply and the symmetric mode amplitude is rather high. To understand the mechanisms that result in such interruptions, the 3D structures will be reconstructed from isolated planar measurements using a low order model based on the most dominant POD modes and their correlation with the surface pressure.

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