

Abstract Submitted  
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**Use of passively actuated flaps for enhanced lift for pitching and heaving airfoils** FIRAS SIALA, CAMERON PLANCK, JAMES LIBURDY, Oregon State Univ — The enhanced lift and reduced drag obtained by applying passively actuated leading and trailing flaps to a low aspect ratio flat wing during heaving and pitching at moderate Reynolds numbers ( $10^4$ ) is demonstrated. Direct force measurements are obtained during the cyclic motion and are synchronized with the tracking of the motion of the passive flaps. The flaps are controlled using torsion springs and their natural frequency is found to play a dominant role in determining the lift enhancement. Results are shown for a range of heaving and pitching conditions of amplitude and frequency, with the pitching phase offset ninety degrees from the heaving. Flow visualization is used to document the transient wake conditions. The lift and drag forces are shown to be enhanced near the peak effective angle of attack during the cycling motion resulting in a net mean lift increase.

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