

Abstract Submitted  
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**Chord-wise Tip Actuation on Flexible Flapping Plates**<sup>1</sup> NATHAN MARTIN, MORTEZA GHARIB, Caltech — The aerodynamic characteristics of low aspect ratio flapping plates are strongly influenced by the interaction between tip and edge vortices. This has led to the development of tip actuation mechanisms which bend the tip towards the root of the plate in the span-wise direction during oscillation to investigate its impact. In our current work, a tip actuation mechanism to bend a flat plate's two free corners towards one another in the chord-wise direction is developed using a shape memory alloy. The aerodynamic forces and resulting flow field are investigated from dynamically altering the tip chord-wise curvature while flapping. The frequency of oscillation, stroke angle, flexibility, and tip actuation timing are independently varied to determine their individual effects. These results will further the fundamental understanding of flapping wing aerodynamics.

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