

Abstract Submitted
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Separation Bubble Subject to a Compliant Surface: A Linear Approach¹ TSO-KANG WANG, KOUROSH SHOELE, Florida State University — This study aims to build the understanding of the interaction between a separation bubble and compliant surface. As the lighter and active materials are used more in the modern aircraft design, the increasing compliance of the wings also increases the risk of instability. Looking into a canonical problem with controlled separation induced by suction and blowing atop the compliant membrane, we analyze how different physical properties and boundary conditions affect the interaction between the compliant surface and the separation bubble. Assuming small perturbation, a linear model is built to allow fast iteration of the fluid-structure interaction system. The role of surface compliancy on the boundary layer structure is investigated and with the insight from the unsteady dynamics of separation, we present potential controller designs for the compliant wing to suppress or facilitate the separation.

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