

Abstract Submitted
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Separation Bubble Dynamics in Single and Multiple STBLIs¹

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— We first analyze the low-frequency motion of incipient shock-induced separation using the results of large-eddy simulation (LES) of an oblique shock impinging on a supersonic turbulent boundary layer ($M_\infty = 2.28$, $\varphi = 8^\circ$, $Re_\theta = 2300$). Through analysis of low-pass filtered data fields, evidence is found of a correlation between the low-frequency motion and a periodic exchange of mass between the separation bubble and shear layer. Integral mass and momentum budgets in filtered bubbles are computed from the LES data to gain insight into the mechanism of low-frequency unsteadiness, and time signals of several indicators of bubble dynamics are analyzed. Additionally, a preview of results is presented from LES of a normal shock train in a constant area duct. Significant three-dimensionality is observed, and its effects on separation dynamics are described, when viscous side-wall boundary conditions are imposed in the spanwise direction.

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