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Quantification of Streamline Vectors and Application to Surface Characteristics of Swept Shock Wave/Boundary Layer Interactions (SBLI) LEE MEARS, NISHUL ARORA, ANDREW BALDWIN, FARRUKH ALVI, Florida State University, JONATHAN NAUGHTON, University of Wyoming — Surface streamlines obtained using surface oil visualization typically provide a qualitative perspective on the salient characteristics of complex flows, including lines of separation and reattachment. This is especially important for complex, 3D flow fields such as the separated region beneath a fin-generated swept shock wave/boundary layer interaction (SBLI). This study focuses on quantitatively processing limiting surface streamlines using a PIV-based cross-correlation technique to determine displacement vectors between successive images. Initial skin friction measurements in SBLI that require quantitative surface streamline information will be discussed. Furthermore, controlled unsteady disturbances are introduced using high-momentum Resonance Enhanced Microjets (REM) at two wall locations - upstream of the interaction and underneath the separated region. The surface streamlines and skin friction measurements provide a framework to examine the global flow response and how disturbances propagate within the interactions, which is useful for improving the current understanding of swept SBLI dynamics.

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