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Investigation of Corner Flows in Complex Supersonic Rectangular Jet Nozzles[1] SETH KELLY, TYLER VARTABEDIAN, EMMA GIST, DOMINIC DIDOMINIC, MARK GLAUSER, Syracuse University — The understanding of complex turbulent flows is of upmost importance when designing propulsive systems for next-generation-plus aircraft. Due to the highly unsteady nature of these flows, innovative techniques are required to extract the key physics insights that effect the overall performance of jet nozzles. The experiments in this study investigate the flow from a rectangular jet nozzle, specifically a Single Expansion Ramp Nozzle (SERN) over a proximal surface. The primary area of investigation is the flow in the corner regions and their influence on the downstream shear layers. The experiments conducted utilized a variety of measurement techniques including: Particle Image Velocimetry (PIV) to obtain high-resolution velocity measurements, high frequency response pressure transducers to measure the unsteady deck surface pressure, and simultaneous far field acoustic measurements. These measurement techniques will help determine the effects of the jet nozzle corner regions on both the wall (deck plate side) and free (SERN side) shear layers. Additionally, this study aims to determine the influence of the corner flows on the downstream separation region as well as their role in near wall turbulence dynamics and unsteady deck loading.

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