Abstract Submitted
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Development of Schlieren Imaging for Analysis of Supersonic Complex Multi-stream Rectangular Nozzle[1] THOMAS COLEMAN, MATTHEW BERRY, ANDREW MAGSTADT, Syracuse University, SIVARAM GOGINENI , Spectral Energies LLC., MARK GLAUSER, Syracuse University, SKYTOP TURBULENCE LABORATORIES TEAM, SPECTRAL ENERGIES LLC. COLLABORATION — A schlieren apparatus has been installed to provide the shock structure of the flow in a supersonic complex multi-stream rectangular jet nozzle. The schlieren images collected are being used for analysis which is paired with unsteady pressure data taken simultaneously, both of which complement PIV data taken in same facility. The schlieren setup is of Herschellian z-type configuration aligned vertically and perpendicular to the nozzle exit. By making use of large twin parabolic mirrors, a 12.5 inch diameter test window has been achieved, capable of capturing the evolution of shock cells from development to collapse. An LED light source was used with its driver circuit to allow for controlled microsecond pulses for collecting time resolved schlieren. Schlieren results to date indicate that there is a shock train arising inside the nozzle and persisting downstream that is quasi steady. This has also been observed in simulations. The shock structure appears to have a dominant effect in that they localize and provide the skeleton for the other flow structures, affecting and being affected by the adjacent shear layers.

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