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Time-resolved schlieren POD and aft deck pressure correlations on a rectangular supersonic nozzle and sonic wall jet[1] MATTHEW BERRY, ANDREW MAGSTADT, Syracuse Univ, CORY STACK, DATTA GAITONDE, Ohio State Univ, MARK GLAUSER, Syracuse Univ — A multi-stream single expansion ramp nozzle (SERN) with aft deck, based on three-stream engine concepts, is currently undergoing experimental tests at Syracuse Universitys Skytop Turbulence Laboratory. In the context of this study, we view this as an idealized representation consisting of two canonical flows; a supersonic convergent-divergent (CD) nozzle and a sonic wall jet (representing the 3^{rd} stream). The jet operates at a bulk flow of $M_{j,1} = 1.6$ and wall jet $M_{j,3} = 1.0$. Proper orthogonal decomposition (POD) is then performed on the schlieren images and the time-dependent coefficients are related to the near-field deck pressure. Structures within the flow field are correlated to particular flow events and help track the downstream evolution of the jet. A multitude of scales are seen within the flow corresponding to a wide range of coherent structures. High fidelity LES is also performed on the same nozzle geometry and relations are made back to the experiments.

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