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Flow and Noise Characteristics of Under- and Over-expanded Supersonic Rectangular Jets of Aspect Ratio 2 RYAN JOHNSON, KAMAL VISWANATH, ANDREW CORRIGAN, KAZHIKATHRA KAILASANATH, Naval Research Lab, EPHRAIM GUTMARK, University of Cincinatti — Simulations of under- and over-expanded flow for two operating temperatures were con- ducted with a low aspect ratio, AR = 2.0, rectangular nozzle. These cases are compared to the same nozzle at the design pressure ratio. The simulated acoustic data are validated against experimentally recorded sound pressure level (SPL) spectra. The axial flow structure is examined along parallel lines that originate at the center and nozzle walls in the direction of the core flow. The shock cell structure, jet core length, and the axial distributions of the flow are different in all observed planes for the over-, under-, and ideally-expanded jet flow cases. How these flow structures contribute to SPL and overall sound pressure levels (OASPL) is discussed.

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