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Flow Structures and Noise Produced by a Heated Rectangular Nozzle with a Third Stream and Aft Deck CHRISTOPHER RUSCHER, SIVARAM GOGINENI, Spectral Energies, LLC, BARRY KIEL, Air Force Research Laboratory — Jet noise is a huge issue that affects both civilian and military aviation and is a two-fold problem. Near-field noise causes hearing damage and is of great concern to the Navy. Far-field noise is also a concern for military and civilian aircraft. For military jets, the trend has shown that newer and more advanced planes are louder than their predecessors. Most of these planes are designed keeping the performance as the main driver in mind while the jet noise becomes an afterthought. To remedy this and to aid the design process, we propose to create a joint noise and performance prediction tool. To create this tool, one must understand how the near-field flow structures generate noise and how they are related to far-field noise. In the current work, we considered rectangular, three-stream nozzle with an aft deck and investigated the flow structures such as corner vortices, shocks and their impact on the noise generation mechanism. We have also used state-of-the-art data analytical tools such as wavelets, POD, and stochastic estimations.

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