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Low-dimensional and Data Fusion Techniques Applied to a Rectangular Supersonic Multi-stream Jet[1] MATTHEW BERRY, Syracuse University, CORY STACK, Ohio State University, ANDREW MAGSTADT, MOHD ALI, Syracuse University, DATTA GAITONDE, Ohio State University, MARK GLAUSER, Syracuse University — Low-dimensional models of experimental and simulation data for a complex supersonic jet were fused to reconstruct time-dependent proper orthogonal decomposition (POD) coefficients. The jet consists of a multi-stream rectangular single expansion ramp nozzle, containing a core stream operating at $M_{j,1} = 1.6$, and bypass stream at $M_{j,3} = 1.0$ with an underlying deck. POD was applied to schlieren and PIV data to acquire the spatial basis functions. These eigenfunctions were projected onto their corresponding time-dependent large eddy simulation (LES) fields to reconstruct the temporal POD coefficients. This reconstruction was able to resolve spectral peaks that were previously aliased due to the slower sampling rates of the experiments. Additionally, dynamic mode decomposition (DMD) was applied to the experimental and LES datasets, and the spatio-temporal characteristics were compared to POD.

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Matthew Berry
Syracuse University

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