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Analysis of a Coupled LES-Synthetic Turbulence Modeling Approach for Jet Noise Prediction JOSHUA BLAKE, ADRIAN SESCU, Mississippi State University, DAVID THOMPSON, Retired, YUJI HATTORI, Tohoku University — Turbulence modeling for jet noise remains a challenge due to the wide range of temporal and spatial scales present in the flow. Smaller turbulent scales generate higher-frequency jet noise content that resides in a critical range for human hearing. Resolving the sound generated by these smaller turbulent scales, while necessary for predicting jet noise spectra, requires an excessive amount of computational resources for either LES or DNS. With the goal of reducing the cost needed to predict higher-frequency jet noise content, we employ a Coupled LES-Synthetic Turbulence (CLST) method, where-in large-scale flow structures are resolved via very large eddy simulations (VLES) and the smaller-scale flow structures are modeled via a Synthetic Eddy Method (SEM). Sweeping is achieved by convecting the synthesized turbulent field with the large-scale resolved turbulent flow field. Acoustic sources are generated by combining large- and small-scale fluctuations in source terms for the linearized Euler equations (LEE). Initial near-field noise results demonstrate the feasibility of a CLST approach for jet noise prediction.

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