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Sources of Broadband Fan Noise in the NASA/GE Source Diagnostic Test Fan[1] VIVEK SHYAMASUNDAR, DANIEL BODONY, University of Illinois at Urbana-Champaign — As a result of continuous progress in reducing the jet exhaust noise issued from commercial, high bypass ratio turbofan engines, it is now known that broadband fan noise (BBFN) is the dominant source of noise at take-off. Broadband fan noise contains a wide range of frequencies and is associated with turbulent flow and its interaction with a solid boundary, with emphasis on rotor self-noise and rotor-stator interaction. Rotor self-noise is caused by trailing edge scattering of hydrodynamic turbulent pressure fluctuations into sound while rotor-stator interactions involves the rotor-shed turbulent wake impinging upon the downstream stator. Existing semi-empirical noise models for efficiently predicting BBFN are limited because of the challenges associated with modeling the on-blade and interstage turbulence. In this talk we present a large-eddy simulation of the NASA/GE Source Diagnostic Test fan whose goal is to directly simulate the turbulent sources of noise and provide data for assessing and improving the existing noise models. The fan was extensively studied at the NASA Glenn Research Center and we compare predicted flow data to measured flow data.

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