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Scattering of an entropy disturbance into sound by a symmetric thin body[1] DANIEL BODONY, University of Illinois at Urbana-Champaign — The interaction of a convecting entropy disturbance, such as generated by a gas turbine combustor, with a solid object is known to generate sound. The sound generation is due to (i) the acceleration of the convected disturbance by the mean flow and (ii) satisfaction of the wall-boundary condition on the object. This process, which leads to the so-called indirect combustion noise, is known to be present in modern gas turbine engines but its specific details are not known, including its overall contribution to the acoustic signature of the engine and its influence on the combustor. Computational and analytical results are presented to examine the sound field created by a localized entropy disturbance convecting in the vicinity of a symmetric thin body. Unsteady calculations of the compressible Euler equations are used to directly compute the radiated sound. Rapid distortion theory is used, when combined with a low frequency Green's function, to estimate the dominant radiated field. It is found that the source structure is dominated by a streamwise-oriented dipole, with the most important interactions occurring near the stagnation points.

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Daniel Bodony
University of Illinois at Urbana-Champaign

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