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**Transmission and scattering of acoustic energy in turbulent flows**

DATTA GAITONDE, S UNNIKRISHNAN, Ohio State Univ - Columbus — Sound scattering and transmission in turbulent jets are explored through a control volume analysis of a Large-Eddy Simulation. The fluctuating momentum flux across any control surface is first split into its rotational turbulent ($(\rho\mathbf{u})'_{\mathbf{H}}$) and the irrotational-isentropic acoustic ($(\rho\mathbf{u})'_{\mathbf{A}}$) components using momentum potential theory (MPT). The former has low spatio-temporal coherence, while the latter exhibits a persistent wavepacket form. The energy variable, specifically, total fluctuating enthalpy, is also split into its turbulent and acoustic modes, $H'_H$ and $H'_A$ respectively. Scattering of acoustic energy is then $(\rho\mathbf{u})'_{\mathbf{H}}\mathbf{H}'_{\mathbf{A}}$, and transmission is $(\rho\mathbf{u})'_{\mathbf{A}}\mathbf{H}'_{\mathbf{A}}$. This facilitates a quantitative comparison of scattering versus transmission in the presence of acoustic energy sources, also obtained from MPT, in any turbulent scenario. The wavepacket converts stochastic sound sources into coherent sound radiation. Turbulent eddies are not only sources of sound, but also play a strong role in scattering, particularly near the lipline. The net acoustic flux from the jet is the transport of $H'_A$ by the wavepacket, whose axisymmetric and higher azimuthal modes contribute to downstream and sideline radiation respectively.

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