

Abstract Submitted
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Modeling unsteady sound refraction by coherent structures in a high-speed jet¹ PINQING KAN, JACQUES LEWALLE, Syracuse University — We construct a visual model for the unsteady refraction of sound waves from point sources in a $Ma = 0.6$ jet. The mass and inviscid momentum equations give an equation governing acoustic fluctuations, including anisotropic propagation, attenuation and sources; differences with Lighthill's equation will be discussed. On this basis, the theory of characteristics gives canonical equations for the acoustic paths from any source into the far field. We model a steady mean flow in the near-jet region including the potential core and the mixing region downstream of its collapse, and model the convection of coherent structures as traveling wave perturbations of this mean flow. For a regular distribution of point sources in this region, we present a visual rendition of fluctuating distortion, lensing and deaf spots from the viewpoint of a far-field observer.

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Jacques Lewalle
Syracuse University

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