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**High-frequency Analysis of Acoustic Refraction Effects in Turbulent Flames** RICKY REUSSER, MATTHIAS IHME, Department of Aerospace Engineering, University of Michigan — The consideration of refraction effects in turbulent reacting flows is crucial for the accurate characterization of sound emission and directivity, particularly at high frequencies. The localized heat release and the associated large temperature gradients in flames can significantly affect the sound transmission to the far field. In this work, refraction of acoustic waves in a series of turbulent flames is considered using Gaussian beam analysis. This model is extended to accurately account for sound speed inhomogeneities. Acoustic results and sound directivity from a point source distribution are compared with solutions obtained from the classical ray acoustic analysis and continuous wave equation. Based on the extended Gaussian beam model, a simplified model for the prediction of the acoustic radiation in turbulent flames is presented, for which the acoustic source term distribution is extracted from a large-eddy simulation. Computational results are discussed and compared with detailed simulation data.

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