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Far-field radiation of large-scale turbulent structures using wave-packet models ARNAB SAMANTA, KRISTJAN GUDMUNDSSON, California Institute of Technology, RAMONS REBA, United Technologies Research Center, TIM COLONIUS, California Institute of Technology — Our study concerns sound generation from large-scale turbulent structures of both heated and cold round jets. We obtain predictions for the far-field sound based on wave-packet models that are, in turn, motivated by pressure fluctuations measured experimentally using a microphone array. A Kirchhoff-surface-based projection method has been developed to predict the far-field sound from an equivalent source, defined using the two-point space-time correlations of hydrodynamic pressure measured near a conical surface surrounding the jet plume. The predictions for the aft angles, particularly at lower frequencies are generally good. However, the sensitivity of this projection method to various model and physical parameters is not well understood. Techniques like near-field filtering of the microphone data, which can separate out the acoustic and hydrodynamic components of the pressure signal and also proper orthogonal decomposition (POD), which tends to filter out the uncorrelated fluctuations, are examined to provide better understanding of how these large-scale structures and their wave-packet representations radiate to the far field.

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