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Sound radiation from instability waves in subsonic jets: entropy sound and superdirectivity LUTZ LESSHAFFT, PATRICK HUERRE, LadHyX, Ecole Polytechnique, France, PIERRE SAGAUT, LMM, University Pierre et Marie Curie, France — The acoustic field radiated by instability wave packets in subsonic round jets is investigated by direct numerical simulation. The directly computed acoustic far field is compared to solutions of the Lighthill equation. Wave packets that emerge in response to forcing in convectively unstable isothermal jets emit a quadrupole sound field. If the jet is sufficiently heated with respect to the ambient medium, the occurrence of absolute instability gives rise to self-sustained global oscillations (global modes). The acoustic field emitted by such global modes displays the directivity of a dipole. An investigation of the Lighthill equation reveals that this dipole field in hot jets is caused by entropy-related source terms, whereas the dominant acoustic sources in isothermal jets are related to Reynolds stresses. Conditions for the occurrence of superdirective sound fields and for their numerical observation are explored.

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