

Jordan, Peter; Colonius, Tim

Wave packets and turbulent jet noise. (English) [Zbl 1359.76257](#)

Davis, Stephen H. (ed.) et al., Annual review of fluid mechanics. Vol. 45. Palo Alto, CA: Annual Reviews (ISBN 978-0-8243-0745-5/hbk). Annual Review of Fluid Mechanics 45, 173-195 (2013).

Summary: Turbulent jet noise is a controversial fluid mechanical puzzle that has amused and bewildered researchers for more than half a century. Whereas numerical simulations are now capable of simultaneously predicting turbulence and its radiated sound, the theoretical framework that would guide noise-control efforts is incomplete. Wave packets are intermittent, advecting disturbances that are correlated over distances far exceeding the integral scales of turbulence. Their signatures are readily distinguished in the vortical, turbulent region; the irrotational, evanescent near field; and the propagating far field. We review evidence of the existence, energetics, dynamics, and acoustic efficiency of wave packets. We highlight how extensive data available from simulations and modern measurement techniques can be used to distill acoustically relevant turbulent motions. The evidence supports theories that seek to represent wave packets as instability waves, or more general modal solutions of the governing equations, and confirms the acoustic importance of these structures in the aft-angle radiation of high subsonic and supersonic jets. The resulting unified view of wave packets provides insights that can help guide control strategies.

For the entire collection see [\[Zbl 1258.76021\]](#).

MSC:

[76Q05](#) Hydro- and aero-acoustics

[76F70](#) Control of turbulent flows

[76-02](#) Research exposition (monographs, survey articles) pertaining to fluid mechanics

Cited in **51** Documents

Keywords:

[aeroacoustics](#); [jet noise](#); [turbulence](#); [coherent structures](#); [control](#)

Full Text: [DOI](#)