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Flow-based decomposition of turbulent-jet noise MARCO RAIOLA, University Carlos III of Madrid, DANIELE RAGNI, TU Delft — Turbulent jet noise is a complex phenomenon characterized by the interaction of modal and non-modal features in the flow field, the former usually defined as wave-packets in literature. In this work the velocity field of a turbulent round jet at Re=30000 is measured using low-repetition rate tomographic Particle Image Velocimetry. Features in the flow field are extracted on a statistical basis using Proper Orthogonal Decomposition, revealing both non-modal features and features with a clear modal behavior in the streamwise direction which are compatible with the wave-packets reported in literature. The temporal evolution of both velocity and pressure of these features, not readily available from the measurements, is estimated through the Galerkin projection of advection equation and of the Euler pressure equation. This approach is advantageous since it also provides estimates of the interaction between several features/modes. Finally, a similar Galerkin projection is attempted on the Lighthill's equation in order to provide a flow-based decomposition of the far-field noise produced by the jet and to estimate the noise emission due to the cross-interaction of the flow-field modes.

Marco Raiola
University Carlos III of Madrid

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