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Wavelet analysis of a bursting vortex JORI E. RUPPERT-FELSOT, MARIE FARGE, LMD UMR CNRS 8539 Ecole Normale Supérieure, PHILIPPE PETITJEANS, PMMH UMR CNRS 7636 Ecole Supérieure de Physique et Chimie Industrielles — We study the quasi-periodic turbulent bursting of a laboratory produced isolated vortex immersed in laminar flow [Y. Cuypers et al., J. Turb. **7**, N7 (2006)]. Particle Image Velocimetry measurements of the velocity and vorticity field in a plane perpendicular to the axis of the vortex allowed us to resolve the time evolution of the bursting, from the initial laminar vortex through the buildup of the final turbulent energy spectrum. The scaling exponent of the energy spectrum was found to evolve from -1 to -2, with a -5/3 spectrum recovered from the time average. We separated the flow field into a coherent and incoherent component using the discrete wavelet transform (DWT) applied to the vorticity and velocity fields [e.g. M. Farge et al., Phys. Fluids **11**, 2187-2201 (1999)]. We found that the coherent field retained the dynamical and statistical properties of the total field, such as the evolution of the PDF and turbulent energy spectrum, and was efficiently captured by a small percentage of the large amplitude coefficients of the DWT. The incoherent field, corresponding to the remaining small amplitude coefficients, was insensitive to the bursting.

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