Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Wavelet energy spectra of multiphase flows ANDREAS FREUND, ANTONINO FERRANTE, Univ of Washington — Classically, the energy spectrum of a turbulent flow is defined using a Fourier transform of the velocity field from the spatial domain to the frequency domain, where the velocity is represented in a basis of sine waves. This analysis works fine for smooth data like that of a single-phase turbulent flow, but consider the case of multiphase flows, in which the velocity is nonsmooth at the interface between the phases. Discontinuities in the derivatives of velocity may be seen at the interface between the carrier and droplet fluids, and these can introduce spurious oscillations in the energy spectra if computed with the Fourier transform. An alternative definition of the energy spectrum uses the wavelet transform, which can handle discontinuities without producing spurious oscillations in the spectra. Thus, we propose to use the wavelet energy spectrum to analyze multiphase flows and apply it for analyzing the DNS data of droplet-laden decaying isotropic turbulence of Dodd & Ferrante (J. Fluid. Mech. **806** (2016), 356–412).

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Date submitted: 31 Jul 2017 Electronic form version 1.4