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Modulation of isotropic turbulence by deformable droplets of Taylor lengthscale size[1] MICHAEL DODD, ANTONINO FERRANTE, University of Washington — We investigate the effects of finite-size deformable droplets on decaying isotropic turbulence via direct numerical simulation (DNS). DNS is performed using the two-fluid pressure-correction method by Dodd and Ferrante [*J. Comput. Phys.* **273** (2014) 416–434] coupled with the volume of fluid method by Baraldi et al. [*Comput. & Fluids* **96** (2014) 322–337]. We fully-resolve the flow around and inside 3130 droplets of Taylor lengthscale size, resulting in a droplet volume fraction of 0.05. The initial Taylor lengthscale Reynolds number is $\mathrm{Re}_{\lambda 0} = 75$, and the computational mesh has 1024^3 grid points. We analyze the effects on turbulence modulation of varying the droplet- to carrier-fluid viscosity ratio ($1 \leq \mu_d/\mu_c \leq 100$) and the droplet Weber number based on the r.m.s velocity of turbulence ($0.1 \leq \mathrm{We}_{\mathrm{rms}} \leq 5$). We discuss how varying these parameters affects the turbulence kinetic energy budget, and explain the physical mechanisms for such modulation.

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Michael Dodd
University of Washington

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