Abstract Submitted
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A mass-conserving volume of fluid method for DNS of droplet-laden isotropic turbulence ANTONINO FERRANTE, MICHAEL DODD, University of Washington, Seattle — We developed a mass-conserving wisps-free volume of fluid (VoF) method for direct numerical simulation (DNS) of droplet-laden turbulent flows. We used the continuous surface force (CSF) model to include the surface tension within a split-advection and mass-conserving VoF. The liquid-gas interface curvature is computed accurately using a variable-stencil height-function technique. We modified the sequence of the advection sweeps, and our results show that, in the case of non-zero Weber number, the algorithm is accurate and stable. We present DNS results of fully-resolved droplet-laden incompressible decaying isotropic turbulence at initial $Re_\lambda = 190$ using a computational mesh of 1024^3 grid points, droplet volume fraction 0.1 tracking the volumes of 7000 droplets of Weber number $\mathrm{We} = 0.5$ based on the r.m.s. velocity fluctuation, droplet-to-fluid density ratio 10, and initial droplet diameter equal to the Taylor length-scale of turbulence.

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