Abstract Submitted
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A mass-conserving volume of fluid method for two-phase incompressible isotropic turbulence ALBERTO BARALDI, ANTONINO FERRANTE, University of Washington, Seattle — We implemented and investigated a volume of fluid (VoF) method for capturing the motion of an initially spherical interface in incompressible velocity fields. First, we tested the interface reconstruction and advection algorithms in analytical velocity fields: linear translation, solid body rotation, and Taylor-Green vortex. These tests showed that the implemented VoF method conserves mass with machine accuracy. Then, we tested the VoF in incompressible isotropic turbulence. In order to compute the geometrical error, the instantaneous velocity field extracted from DNS was artificially reversed in time by means of a cosine time-function. During this test, the spherical interface, with a diameter of Taylor-length-scale size, deforms, breaks, reconnects and returns to its initial position. Also in this test, our results show that the VoF method conserves mass with machine accuracy. Furthermore, the topology changes are captured without any ad hoc treatment. Thus, we conclude that the implemented VoF is suitable for DNS of two-phase (e.g. gas-liquid or liquid-liquid) incompressible isotropic turbulence.

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