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Turbulence interactions with large bubbles GIOVANNI SOLIGO, ALESSIO ROCCON, University of Udine, ALFREDO SOLDATI, TU Wien, University of Udine — We use direct numerical simulations to study the dynamics of large bubbles in turbulent channel flow. The interactions between the two phases are described by the Phase Field method, which is based on the use of the order parameter, ϕ, that changes continuously across the gas/liquid interface and is uniform in the bulk of the phases. All fluid properties are thus modelled proportional to ϕ. The equation that describes the advection of ϕ in space and time is the Cahn–Hilliard (CH) equation. When coupled with the Navier–Stokes (NS) equation, the resulting CH–NS system is able to describe the complex dynamics of bubbles in turbulence. The CH–NS system is solved using a pseudospectral technique based on a Fourier representation of variables in the periodic directions (streamwise and spanwise) and a Chebyshev representation in the wall-normal direction. To overcome unphysical coalescence phenomena, we examine the role of a surfactant at the interface. We examine the dynamics of large deformable bubbles (d^+=80 w.u.), at fixed Weber number (We=0.75) and considering several density ratios among the two phases. Results from code benchmarking and original investigations in turbulent channel flow will be presented.

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