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Low pressure events of finite size bubbles in homogeneous isotropic turbulence[1] MEHEDI HASAN BAPPY, ALBERTO VELA-MARTIN, PABLO CARRICA, GUSTAVO BUSCAGLIA, None — The study of the behavior of bubbles in turbulent flow is fundamental to the understanding of many two-phase flow applications such as cavitation inception. As gas nuclei evolve in a turbulent flow, the pressure fluctuations can dip below the vapor pressure and trigger cavitation events. Pressure statistics along trajectories of finite bubbles in isotropic homogeneous turbulence is investigated using direct numerical simulations at two Re_λ (150, 240). A modified Maxey-Riley equation is solved to track bubbles of different sizes in the turbulence field. The results show that larger bubbles are more attracted by the vortex cores and spend longer times at low-pressure regions. This has significant impact on the PDF of the pressure experienced by the bubbles, as well as on the statistics of low-pressure events (i.e., average frequency, distribution of duration and inter-event delays). The effect of gravity on these statistics is also addressed. It is shown that gravity is a bubble transport mechanism that competes with flow induced pressure gradients, making the bubbles less sensitive to low-pressure vortex cores.

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