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Spectral Properties of Bubbly Turbulent Flows PRASAD PERLEKAR, VIKASH PANDEY, TIFR Centre for Interdisciplinary Sciences, Tata Institute of Fundamental Research, Hyderabad, 500107, DHRUBADITYA MITRA, NORDITA, Royal Institute of Technology and Stockholm University, SE-10691 Stockholm, Sweden — Suspension of deformable bubbles are ubiquitous in nature, their presence can dramatically alter the rheological properties of flows. We present a DNS study to investigate the spectral properties of the buoyancy-driven bubbly flows in the presence of large scale driving that generates turbulence. The non-dimensional Galilei ($50 < \mathrm{Ga} < 300$) and Reynolds ($50 < \mathrm{Re} < 150$) numbers characterize the flow. Consistent with the experiments, we show that the energy spectrum shows a pseudo-turbulence scaling ($E(k) \sim k^{-3}$) for length scales smaller than the bubble diameter and a Kolmogorov scaling ($E(k) \sim k^{-5/3}$) for scales larger than the bubble diameter. We present a scale-by-scale energy budget analysis to unravel the dominant balances in different regimes.

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