Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Experimental Investigation of Bubble-Induced Turbulence Modulation XU XU, ASHIK MASUK, ASHWANTH SALIBINDLA, SHIYONG TAN, RUI NI, Department of Mechanical Engineering, Johns Hopkins University, Baltimore, MD 21218, USA — Bubble-induced turbulence was often studied in the context of a cluster of bubbles rising in an otherwise quiescent medium, rather than in flows that are already turbulent. In this talk, I will present our new experimental investigations on bubbles interacting with pre-existing intense turbulence, where bubbles can be deformed by surrounding turbulence and also feed kinetic energy back. The unique experimental facility allows us to simultaneously track the 3D deformation dynamics of finite-sized bubbles with the modulation of surrounding turbulence. In particular, we identified two possible turbulence generation mechanisms, one through returning surface energy stored on bubble interface back and the other one through wake dynamics. We will also show the results as a function of different relaxing rate, i.e. how quickly bubbles change their aspect ratios. The results will shed new light on the bubble-induced turbulence modulation and paves the foundation to our understanding of how the deformability affects the two-phase couplings.

Xu Xu
Department of Mechanical Engineering, Johns Hopkins University, Baltimore, MD 21218, USA

Date submitted: 02 Aug 2020 Electronic form version 1.4