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Three-dimensional investigation of the response of bubble/particle motion to grid generated turbulence SAM RABEN, PAVLOS VLACHOS, Virginia Tech — Multiphase turbulent flow can be found in numerous different environments, from biological applications to industrial mineral processing. Often it is desirable to know how the discrete phase, bubbles and/or particles, respond to the turbulent fluctuations present in the surrounding flow. Previous works have developed empirical and semi- empirical relationships for the slip velocity, RMS motion, and collision rates for these discrete phases. These relationships were based upon 1- or 2-D samplings of the flow and therefore were approximations for the field as a whole. This work evaluates the validity of these relationships through the use of Tomographic PIV. Tomographic imaging it capable of providing not only information about the three-dimensional flow field but also motion of the discrete phases as well. An experiment was conducted in grid-generated turbulence where solid particles and bubbles where added. By fully resolving the motion of the flow field and objects present therein, the RMS and slip velocity could be calculated directly. This direct calculation was used to evaluate the validity of the currently available models.

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