Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Gas Bubble Dynamics under Mechanical Vibrations SHAHROUZ MOHAGHEGHIAN, BRIAN ELBING, Oklahoma State University — The scientific community has a limited understanding of the bubble dynamics under mechanical oscillations due to over simplification of Navier-Stockes equation by neglecting the shear stress tensor and not accounting for body forces when calculating the acoustic radiation force. The current work experimental investigates bubble dynamics under mechanical vibration and resulting acoustic field by measuring the bubble size and velocity using high-speed imaging. The experimental setup consists of a custom-designed shaker table, cast acrylic bubble column, compressed air injection manifold and an optical imaging system. The mechanical vibrations resulted in accelerations between 0.25 to 10 times gravitational acceleration corresponding to frequency and amplitude range of 8 - 22Hz and 1 - 10mm respectively. Throughout testing the void fraction was limited to <5%. The bubble size is larger than resonance size and smaller than acoustic wavelength. The amplitude of acoustic pressure wave was estimated using the definition of Bjerknes force in combination with Rayleigh-Plesset equation. Physical behavior of the system was capture and classified. Bubble size, velocity as well as size and spatial distribution will be presented.

Shahrouz Mohagheghian
Oklahoma State University

Date submitted: 01 Aug 2017 Electronic form version 1.4