Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Viscoelastic Sphere Impact onto a Water Pool JOHN ALLEN, University of Hawaii, RAFSAN RABBI, TADD TRUSCOTT, Utah State University — We investigate the impact of visco-elastic water beads (12.5 - 17.5 mm diameter) from heights 35-400 cm upon hydrophilic and hydrophobic liquid pools (0.15 -0.45 ml). A hydrophobic surface is obtained by coating the metallic surface of a contact microphone with Soft99 Glaco Mirror Coat Zero water repellant. Sound production is measured using both contact and air microphones, which are synchronized with a high-speed camera (Phantom V2512) for visualization of the impact and rebound. The results are compared to the impact of an elastic sphere of comparable size. In the hydrophobic case at low heights, the spreading and rebound of the water bead result in the attachment and lift-off of the liquid in a saucer configuration. In this case, the collapse of entrained gas cavities corresponds with an oscillatory acoustic signature upon lift-off. At higher drop heights, the liquid pool breaks up into droplets upon impact and the resulting acoustic signature is similar to that previously reported for aerodynamic droplet break-up. These previously unseen impact phenomena coupled with their unique acoustic behavior provides a great insight into the impact behavior of viscoelastic droplets.

Tadd Truscott
Utah State University

Date submitted: 31 Jul 2019 Electronic form version 1.4