Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Vibration-Induced Gas-Liquid Interface Breakup TIMOTHY O'HERN, JOHN TORCZYNSKI, ED ROMERO, BION SHELDEN, Sandia National Laboratories — Gas-liquid interfaces can be forced to break up when subjected to vibrations within critical ranges of frequency and amplitude. This breakup mechanism was examined experimentally using deep layers of silicone oils over a range of viscosity and sinusoidal, primarily axial vibration conditions that can produce dramatic disturbances at the gas-liquid free surface. Although small-amplitude vibrations produce standing Faraday waves, large-amplitude vibrations produce liquid jets into the gas, droplets pinching off from the jets, gas cavities in the liquid from droplet impact, and bubble transport below the interface. Experiments used several different silicone oils over a range of pressures and vibration conditions. Computational simulations exhibiting similar behavior will be included in the presentation. Applications include liquid fuel rockets, inertial sensing devices, moving vehicles, mixing processes, and acoustic excitation. Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Timothy O'Hern
Sandia National Laboratories

Date submitted: 30 Jul 2010 Electronic form version 1.4