Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Condensed Phase Combustion in the Presence of Altered Acoustic Disturbances[1] JEFFREY WEGENER, JENNIFER SMOLKE, CRISTHIAN SEVILLA, SOPHONIAS TESHOME, OWEN SMITH, ANN KARAGOZIAN, University of California, Los Angeles — This experimental study focuses on fuel combustion characteristics of liquid droplets and solid spheres during exposure to external acoustic disturbances generated within a closed acoustic waveguide. The study examines combustion during excitation conditions in which the droplet or sphere is situated at or in the vicinity of a pressure node (PN) or a pressure antinode (PAN). During such acoustic excitation, flame orientation is observed to be consistent with the sign of a theoretical acoustic acceleration, analogous to a gravitational acceleration, acting on the burning system. Yet experimentally estimated acoustic accelerations differ quantitatively from that predicted by one theory of the acoustic radiation forces[2]. Altered orientations of the waveguide are used to examine the nature of acoustically generated forces. The present experimental configuration provides a useful test bed for the evaluation of the response of different burning fuels to an acoustically resonant environment, including conditions leading to flame extinction, and can be used to explore a range of condensed phase combustion processes during such acoustic coupling.

[1]Supported by AFOSR.
[2]Tanabe, et al., **PCI**, 2000

Ann Karagozian
University of California, Los Angeles

Date submitted: 03 Aug 2010 Electronic form version 1.4