Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Optical whispering gallery mode induced interface deformation of liquid droplets[1] PENG ZHANG, SUNGHWAN JUNG, Department of Biomedical Engineering and Mechanics, Virginia Tech, Blacksburg, VA 24061, YONG XU, ARAM LEE, Department of Electrical and Computer Engineering, Virginia Tech, Blacksburg, VA 24061 — In this study, we analyze nonlinear processes associated with a high-Q factor whispering gallery mode (WGM) in micro-sized liquid droplets, which can be induced by Kerr nonlinearity, thermal effect, and optical radiation pressure. Optical WGM can produce a radiation pressure on the droplet and induce droplet deformations. In our analysis, the droplet deformation will be obtained both analytically by force balance and numerically by the boundary element method. We will show that the nonlinear optofluidic effect is stronger than the Kerr effect and thermal effect. Time scales of these three nonlinear processes will also be estimated and compared. The feasibility of single photon level nonlinearities will be analyzed.

[1]This research was supported by the National Science Foundation (CBET 1438112).

Peng Zhang
Virginia Tech

Date submitted: 01 Aug 2015 Electronic form version 1.4