Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Bubbly Shock Waves in Multi-modal Cavitation Shedding Dynamics on a NACA0015 Hydrofoil[1] JULIANA WU, HARISH GANESH, STEVEN CECCIO, University of Michigan — Cavitation dynamics on the NACA0015 hydrofoil is known to be multi-modal with abrupt changes in Strouhal number with change in cavitation number at several attack angles. In one of our previous studies we found that cavity collapse can arrest cavity growth abruptly thereby altering the shedding frequency. In addition, occurrence of propagating bubbly shocks that cause leading edge pinch-off is another process that can have an effect on changing the dynamics. In the current study, we obtain time-resolved X-ray densitometry measurements on larger model scale to resolve the processes involved in cloud collapse induced growth-arrest. Furthermore, time-resolved void fraction flow fields measurements obtained using X-ray densitometry, synchronized both with acoustic noise measurements using a hydrophone and dynamic pressure measurements from flush mounted pressure transducers on the model, are used to observe the role of shock waves in causing the abrupt change in cavitation dynamics.

[1]Sponsored by Office of Naval Research

Harish Ganesh
University of Michigan

Date submitted: 28 Jul 2017 Electronic form version 1.4