Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Bifurcating jet in transvere acoustic field EIRIK ASOY, PhD, JOSE G. AGUILAR, Post-doctoral, NICHOLAS A. WORTH, JAMES R. DAWSON, Professor — The far-field of an axisymmetric round jet is usually characterized by the momentum flux at the nozzle exit. However, it has been shown that when the jet is submitted to external forcing, the far-field exhibits different behavior from a classical jet. We present experiments of an axisymmetric jet subjected to external forcing by placing the nozzle exit in a standing acoustic field by forcing a rectangular box with loud-speakers. Several forcing conditions at the nozzle exit, i.e different combinations of transverse and longitudinal velocity oscillations, are achieved by placing the nozzle at different positions relative to the pressure node. Time-resolved Particle Image Velocimetry (PIV) combined with microphone measurements are used to characterize the flow field in a plane of interest and the acoustic fields. It is found that the jet bifurcates, i.e splits into two or three separate momentum streams, at sufficiently high forcing levels when placed anywhere else than at a pressure anti-node. Furthermore, the flow field is asymmetric at any position between the pressure and velocity nodes. This asymmetry is symmetric across the pressure anti node which is shown to be linked to the relative phase between transverse and longitudinal velocity oscillations.

Eirik Asoy
PhD

Date submitted: 26 Jul 2019 Electronic form version 1.4