Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Characterization of Cetacean Blowhole Flow Fields from In Situ Measurements[1] ALVIN NGO, MITCHELL FORD, CHRIS BARTON, RICHARD GAETA, AARON ALEXANDER, ARVIND SANTHANAKRISHNAN, JAMEY JACOB, Oklahoma State University — The stress levels of Atlantic bottlenose dolphins can be quantified through hormone concentrations in mucus samples expelled from the blowhole during regular breathing. Though easily monitored in dolphins under human care, collecting viable mucus samples from wild dolphins is challenging. In order to obtain samples from wild dolphins, a better understanding of the flow characteristics of the jet expelled from a dolphin's blowhole is required. The multi-phase properties of the flow in conjunction with the evasiveness of the dolphins present a significant issue. Analysis of the flow expelled from the blowhole of a dolphin under human care was performed using high speed (4500 frames per second) imaging, and Particle Image Velocimetry was used to generate velocity vector fields. Maximum fluid velocities exiting the blowhole were estimated to be between 22.5 and 27.5 m/s across the three different subjects of varying age and size. A momentum flux analysis was performed to estimate volumetric flow rate and breath intake/outtake characteristics. Characterization of the flow field sets the foundation for the design and development of a dolphin blowhole simulator for sample attainment testing.

[1]Dolphin Quest

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Date submitted: 01 Aug 2019 Electronic form version 1.4