

Abstract Submitted  
for the DFD15 Meeting of  
The American Physical Society

**Large Field of View PIV Measurements of Air Entrainment by SLS SMAT Water Sound Suppression System<sup>1</sup>** MATTHEW STEGMEIR, STAMATIOS POTHOS, DAN BISSELL, TSI, Inc. Shoreview MN — Water-based sound suppressions systems have been used to reduce the acoustic impact of space vehicle launches. Water flows at a high rate during launch in order to suppress Engine Generated Acoustics and other potentially damaging sources of noise. For the Space Shuttle, peak flow rates exceeded 900,000 gallons per minute. Such large water flow rates have the potential to induce substantial entrainment of the surrounding air, affecting the launch conditions and generating airflow around the launch vehicle. Validation testing is necessary to quantify this impact for future space launch systems. In this study, PIV measurements were performed to map the flow field above the SMAT sub-scale launch vehicle scaled launch stand. Air entrainment effects generated by a water-based sound suppression system were studied. Mean and fluctuating fluid velocities were mapped up to 1m above the test stand deck and compared to simulation results.

<sup>1</sup>Measurements performed with NASA MSFC

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Date submitted: 01 Aug 2015

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