December 2011 MSS/LPS/SPS Joint Subcommittee Meeting

ABSTRACT SUBMITTAL FORM

The submission of an abstract is an agreement to complete a final paper for publication and attend the meeting to present this information. Complete all information requested in the author and co-author information sections; the first author listed will receive paper acceptance notices and all correspondence. Abstracts must be submitted electronically; submittal instructions are located in the call for papers. **The abstract deadline date is June 13, 2011.**

ABSTRACT INFORMATION

Title: Validation and Simulation of Ares I Scale Model Acoustic Test - 2 - Simulations at 5 Foot Elevation for Evaluation of Launch Mount Effects

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ABSTRACT SUBMITTAL FORM

Unclassified Abstract

(250-300 words; do not include figures or tables)

The Ares I Scale Model Acoustics Test (ASMAT) is a series of live-fire tests of scaled rocket motors meant to simulate the conditions of the Ares I launch configuration. These tests have provided a well documented set of high fidelity measurements useful for validation including data taken over a range of test conditions and containing phenomena like Ignition Over-Pressure and water suppression of acoustics. Expanding from initial simulations of the ASMAT setup in a held down configuration, simulations have been performed using the Loci/CHEM computational fluid dynamics software for ASMAT tests of the vehicle at 5 ft. elevation (100 ft. real vehicle elevation) with worst case drift in the direction of the launch tower. These tests have been performed without water suppression and have compared the acoustic emissions for launch structures with and without launch mounts. In addition, simulation results have also been compared to acoustic and imagery data collected from similar live-fire tests to assess the accuracy of the simulations. Simulations have shown a marked change in the pattern of emissions after removal of the launch mount with a reduction in the overall acoustic environment experienced by the vehicle and the formation of highly directed acoustic waves moving across the platform deck. Comparisons of simulation results to live-fire test data showed good amplitude and temporal correlation and imagery comparisons over the visible and infrared wavelengths showed qualitative capture of all plume and pressure wave evolution features.