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

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MANAGEMENT APPROVAL

The individual below certifies that the required resources are available to present this paper at the above subject JANNAF meeting.

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Unclassified Abstract

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

An experimental investigation was conducted on a scaled annular pogo accumulator for the Ares I Upper Stage. The test article was representative of the LO2 feedline and preliminary accumulator design, and included multiple designs of a perforated ring connecting the accumulator to the core feedline flow. The system was pulse tested in water over a range of pulse frequency and flow rates. Time dependent measurments of pressure at various locations in the test article were used to extract system compliance, inertance, and resistance. Preliminary results indicated a significant deviation from standard orifice flow theory and suggest a strong depence on feedline average velocity. In addition, several CFD analyses were conducted to investigate the details of the time variant flow field. Both two-dimensional and three-dimensional simulations were performed with time varying boundary conditions used to represent system pulsing. The CFD results compared well with the sub-scale results and demonstrated the influence of feedline average velocity on the flow into and out of the accumulator. This paper presents updated results of the investigation including a parametric design space for determining resistance characteristics. Using the updated experimental results a new scaling relationship has been defined for shear flow over a cavity. A comparison of sub-scale and full scale CFD simulations provided early verification of the scaling of the fluid flowfield and resistance characteristics.