Abstract Submittal Form

Joint Army-Navy-NASA-Air Force (JANNAF)
61st JPM / 42nd SMBS / 38th PEDCS / 29th RNTS / 27th SEPS
Joint Subcommittee Meeting
19 – 22 May 2014

JPM Abstract Due Date: Monday, February 3, 2014

Title: A Modular Aerospike Engine Design Using Additive Manufacturing		
Submitted to: ☒ JPM ☐ SMBS* ☐ PEDCS* ☐ RNTS* ☐ SEPS*		
Mission Area : ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10		
Security Classification: ☐ Secret ☒ Unclassified		
Updated Paper? ☐ Yes ☒ No	Student Paper? ☐ Yes ☒ No	
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Unclassified Abstract (250 – 300 words; do not include figures or tables)

A modular aerospike engine concept has been developed with the objective of demonstrating the viability of the aerospike design using additive manufacturing techniques. The aerospike system is a self-compensating design that allows for optimal performance over the entire flight regime and allows for the lowest possible mass vehicle designs. At low altitudes, improvements in Isp can be traded against chamber pressure, staging, and payload. In upper stage applications, expansion ratio and engine envelope can be traded against nozzle efficiency. These features provide flexibility to the System Designer optimizing a complete vehicle stage. The aerospike concept is a good example of a component that has demonstrated improved performance capability, but traditionally has manufacturing requirements that are too expensive and complex to use in a production vehicle. In recent years, additive manufacturing has emerged as a potential method for improving the speed and cost of building geometrically complex components in rocket engines. It offers a reduction in tooling overhead and significant improvements in the integration of the designer and manufacturing method. In addition, the modularity of the engine design provides the ability to perform full scale testing on the combustion devices outside of the full engine configuration. The proposed design uses a hydrocarbon based gas-generator cycle, with plans to take advantage of existing powerhead hardware while focusing DDT&E resources on manufacturing and sub-system testing of the combustion devices. The major risks for the modular aerospike concept lie in the performance of the propellant feed system, the structural integrity of the additive manufactured components, and the aerodynamic efficiency of the exhaust flow.

- By submitting an abstract, you agree to both complete a final paper for publication and to attend the meeting to present this information.
- Submit abstracts electronically; submittal instructions are found in the call for papers.
- Direct questions to Shelley Cohen, by phone at 410.992.7302 x 215, or email to scohen@cpiac.jhu.edu.