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: The Grid Density Dependence of the Unsteady Pressures of the J-2X Turbines

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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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The J-2X engine was originally designed for the upper stage of the cancelled Crew Launch Vehicle. Although the Crew Launch Vehicle was cancelled the J-2X engine, which is currently undergoing hotfire testing, may be used on future programs. The J-2X engine is a direct descendent of the J-2 engine which powered the upper stage during the Apollo program. Many changes including a thrust increase from 230K to 294K lbf have been implemented in this engine. As part of the design requirements, the turbine blades must meet minimum high cycle fatigue factors of safety for various vibrational modes that have resonant frequencies in the engine’s operating range. The unsteady blade loading is calculated directly from CFD simulations. A grid density study was performed to understand the sensitivity of the spatial loading and the magnitude of the on blade loading due to changes in grid density. Given that the unsteady blade loading has a first order effect on the high cycle fatigue factors of safety, it is important to understand the level of convergence when applying the unsteady loads. The convergence of the unsteady pressures of several grid densities will be presented for various frequencies in the engine’s operating range.