

2011 Ground Testing Highlights Article  
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James C. Cross & Steven J. Buchholz  
NASA Ames Research Center

Two tests supporting development of the launch abort system for the Orion Multi-Purpose Crew Vehicle were run in the NASA Ames Unitary Plan wind tunnel last year. The first test used a fully metric model to examine the stability and controllability of the Launch Abort Vehicle during potential abort scenarios for Mach numbers ranging from 0.3 to 2.5. The aerodynamic effects of the Abort Motor and Attitude Control Motor plumes were simulated using high-pressure air flowing through independent paths. The aerodynamic effects of the proximity to the launch vehicle during the early moments of an abort were simulated with a remotely actuated Service Module that allowed the position relative to the Crew Module to be varied appropriately.

The second test simulated the acoustic environment around the Launch Abort Vehicle caused by the plumes from the 400,000-pound thrust, solid-fueled Abort Motor. To obtain the proper acoustic characteristics of the hot rocket plumes for the flight vehicle, heated Helium was used. A custom Helium supply system was developed for the test consisting of 2 jumbo high-pressure Helium trailers, a twelve-tube accumulator, and a 13MW gas-fired heater borrowed from the Propulsion Simulation Laboratory at NASA Glenn Research Center. The test provided fluctuating surface pressure measurements at over 200 points on the vehicle surface that have now been used to define the ground-testing requirements for the Orion Launch Abort Vehicle.