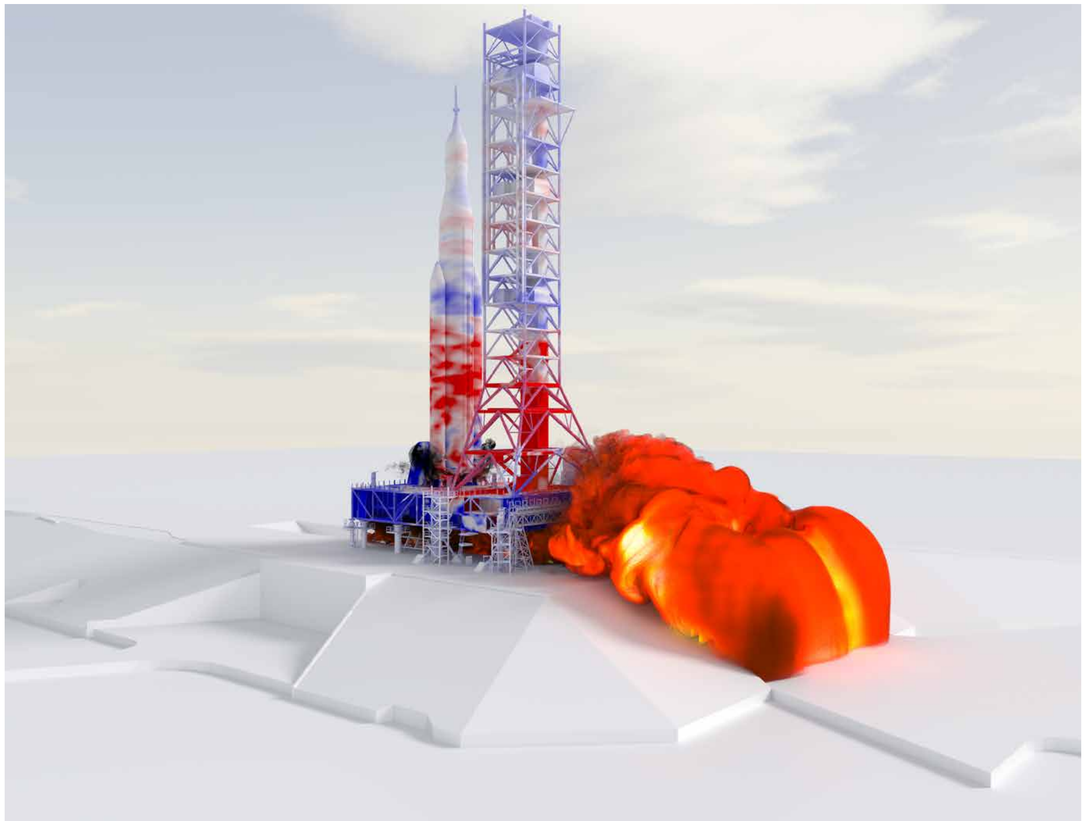
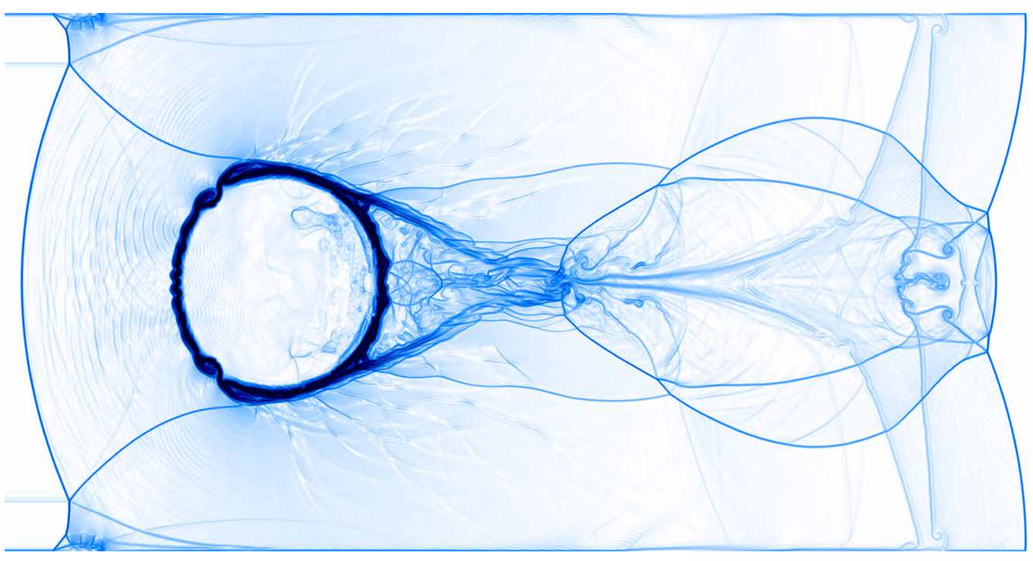
National Aeronautics and
Space Administration

NASA EXPLORES HUMAN SPACE FLIGHT

Towards Multiphysics Prediction Capability for the KSC Launch Environment



Snapshot from a simulation of launch ignition for NASA's next-generation Space Launch System. Surfaces are colored by pressure (red is high; blue is low) while particles are colored by temperature (orange is hot; black is cooler). *Michael F. Barad, Timothy Sandstrom, NASA/Ames*



Multiphase simulation of a powerful shock wave passing through a water column showing phase change, including cavitation bubbles in the water. The darker color indicates large changes in density. *Jordan B. Angel, NASA/Ames*

Launching powerful space vehicles like the next-generation Space Launch System (SLS) creates extreme pressure waves that could damage the vehicle and the launch environment at NASA's Kennedy Space Center (KSC). To ensure mission safety, the Ignition Overpressure Protection and Sound Suppression (IOP/SS) water deluge system suppresses the strong acoustic waves by delivering almost a half-million gallons of water to the mobile launcher and flame deflector. To better understand the effectiveness of this system at different operating conditions, the Launch Ascent and Vehicle Analysis (LAVA) code, developed at NASA's Ames Research Center, is currently being modified and extended to incorporate the complex physics needed to model the IOP/SS system.

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