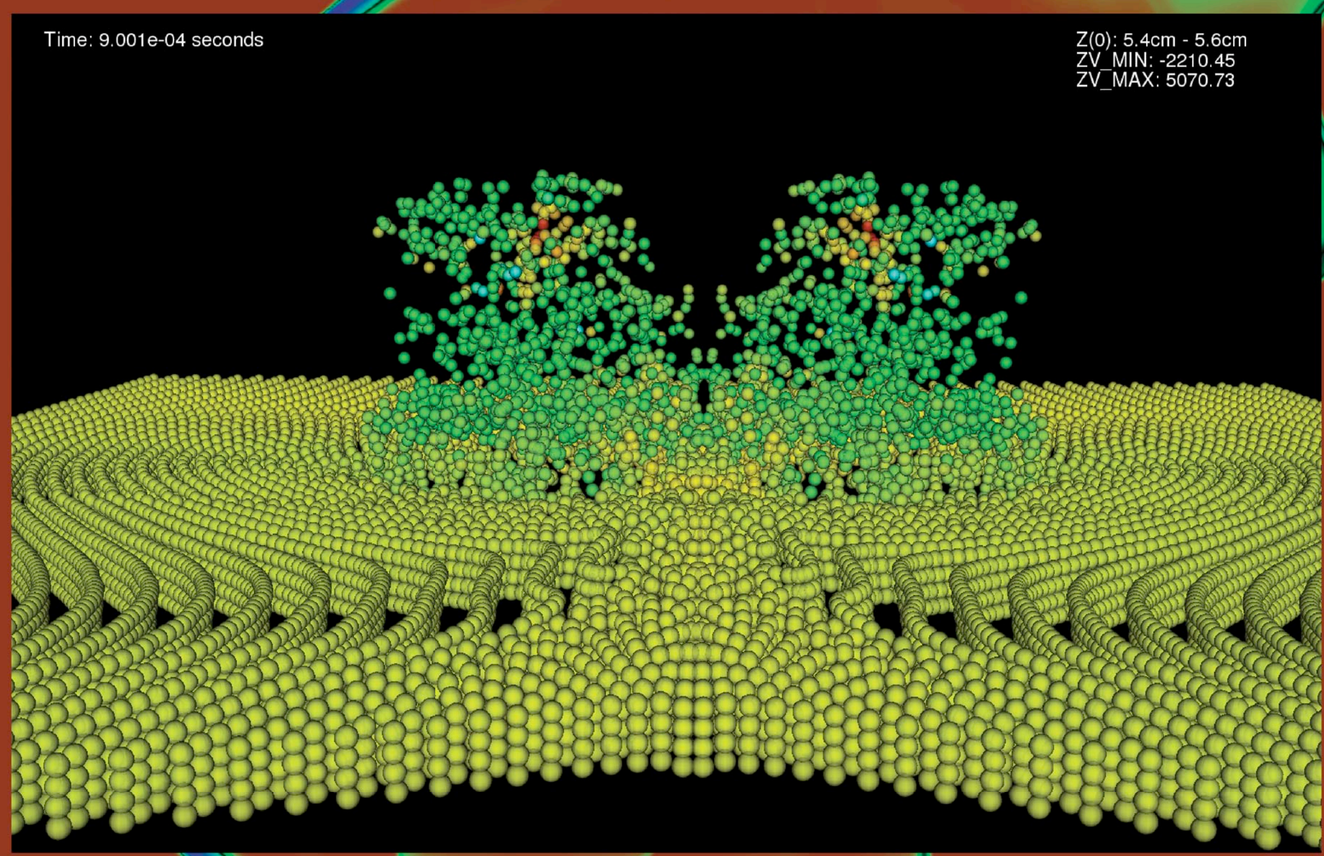
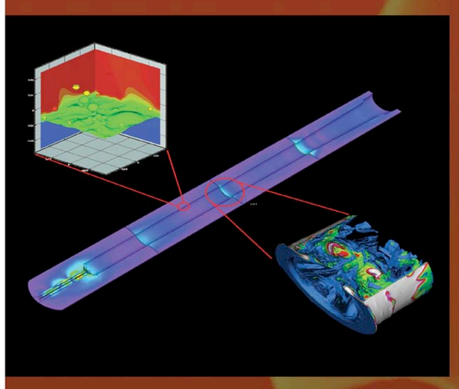
ASC Alliances



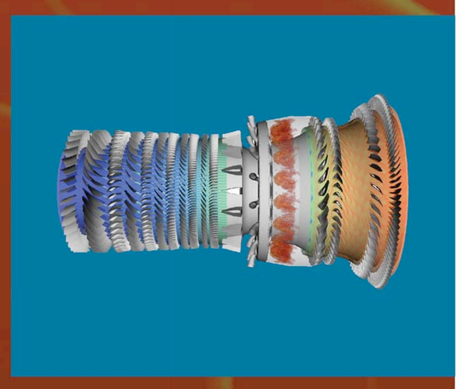
ASC's Partnership with U.S. Universities

In 1997, the ASC Program initiated the Academic Strategic Alliance Program (ASAP) by creating long-term strategic alliances with five U.S. universities to focus on multi-disciplinary computation science problems. The computational science, computer science, and computational mathematics methodologies and tools developed by the Alliances demonstrate to a wide scientific computing community that validated simulations can be carried out using unclassified problems similar in complexity to what the national laboratories face for the DOE Stockpile Stewardship Program. ASAP provides training opportunities for graduate students and post-doctoral fellows who are potential candidates for laboratory, teaching, and industrial employment. The image to the left, from the *Center for Astrophysical Thermonuclear Flashes* at the University of Chicago, shows the evolution of a sample of tracer particles embedded in a vortex flow field created after the passage of a Mach 1.2 shockwave through a column of a high density gas.

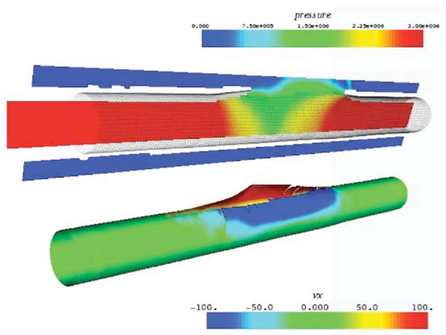


Center for the Simulation of Advanced Rockets **at the University of Illinois** —Space shuttle solid rocket booster at three different spatial resolutions. Aluminum droplets are lifted from the surface by gaseous products released from the combustion of ammonium perchlorate particles and fuel binder.

Center for the Simulation of Accidental Fires & Explosives **at the University of Utah**—Sectional view of the rupturing of a steel container that was initially filled with a plastic bonded explosive and heated by a fire.



Center for Integrated Turbulence Simulations **at Stanford University**—Comprehensive simulation of the flow through an entire jet engine, done in collaboration with Pratt & Whitney. Contours of entropy in the high-pressure compressor and in the first two stages of the turbine, as well as contours of temperature in the combustor of a Pratt & Whitney engine.



Center for Simulating the Dynamic Response of Materials **at the California Institute of Technology**—Detonation wave (simulating ethylene) propagating through a flawed tube fractures the tube and sends a blast wave of gas through the ruptured tube. Integrated simulation using the coupled fluid-solid mechanics capability of the Virtual Test Facility.

Supercomputing Conference 2005

Visualize the Difference

National Nuclear Security Administration