Southwest Research Institute®

Computational Mechanics

Southwest Research Institute® (SwRI®) develops and applies state-of-the-art computational tools using large-scale numerical simulations to solve a broad range of client problems. Tools include hydrocodes, engineering codes, and computational fluid dynamics (CFD) codes. The SwRI Computational Mechanics Section technical staff has expertise in structured and unstructured grid solvers using either finite volume or finite element methods. The Section maintains a large suite of codes for simulating compressible or incompressible flows, structural response and deformation, thermal and chemical reaction effects, and other complex physics such as turbulence modeling.

Capabilities

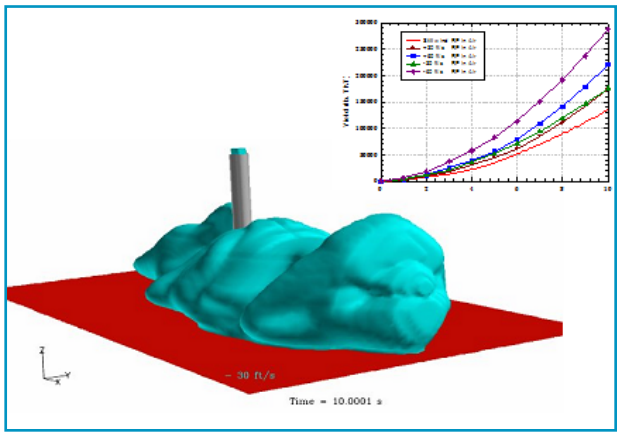
- Code development
- Code enhancement and modification
- Penetration mechanics
- Computational constitutive modeling
- Warhead modeling
- Computational fluid dynamics (CFD)
- Fluid-structure interaction
- Computational fracture mechanics
- Multiphase transport modeling
- Energetic material modeling
- Material behavior prediction
- Turbulence modeling
- Numerical uncertainty
- Numerical methods development

Experience

- Development and implementation of physical models
- Simulation of large deformation, dynamic phenomena
- Simulation of large-scale processes and systems
- Application of computer programs to real-world problems
- Development of new algorithms for complex, multidisciplinary problems

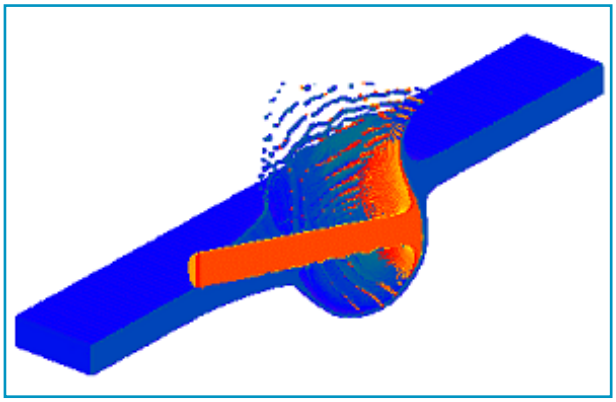
Computational Tools

- High-end workstations (Unix, Linux, Windows)
- Parallel computers (Beowulf systems)
- Fast switched-ethernet and ATM networks
- Access to NSF, NASA, DOD and DOE supercomputers
- SwRI-developed codes
- Select commercial codes



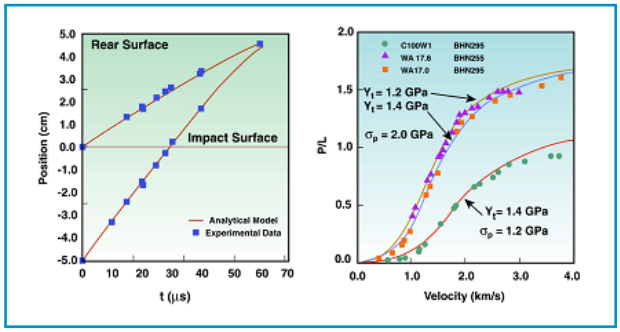
D014051

Simulation of release of fuel into the atmosphere (CFD simulation)



D014055

Simulation of penetration of a long rod into a yawed target (Hydrocode simulation)



D014054

Walker-Anderson analytical model prediction of penetration (Engineering codes/tools)

KEYWORDS

Hydrocodes

Engineering Codes

Computational Fluid Dynamics

CFD

Numerical Simulation

Finite Volume Methods

Eulerian Methods

Lagrangian Methods

Arbitrary Lagrangian/ Eulerian (ALE) Methods

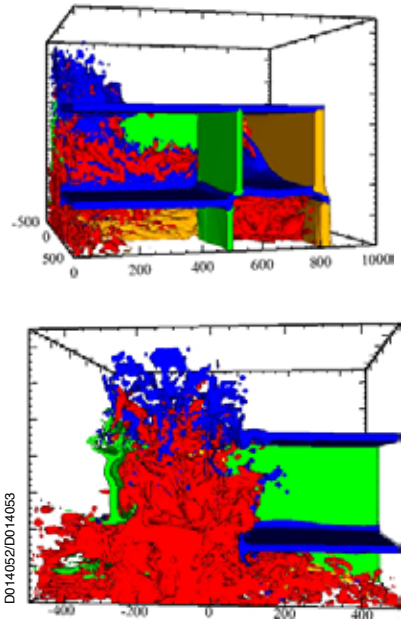
Fluid Flow

Material Response

Deformation

Penetration

Fracture



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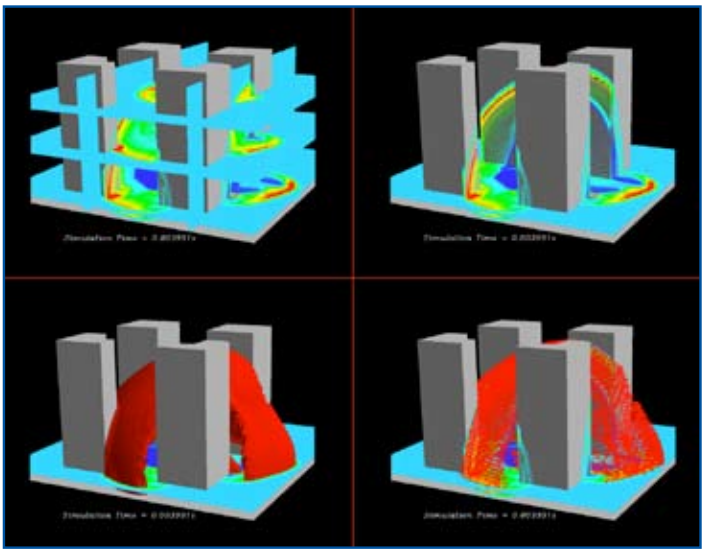
Simulation of detonation of an explosive device in a structure (Hydrocode simulation)



D005000

Simulation of high explosive detonation in an urban center (CFD simulation)

Southwest Research Institute is an independent, nonprofit, applied engineering and physical sciences research and development organization using multidisciplinary approaches to problem solving. The Institute occupies 1,200 acres in San Antonio, Texas, and provides more than 2 million square feet of laboratories, test facilities, workshops and offices for more than 3,300 employees who perform contract work for industry and government clients.

We welcome your inquiries.

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