

Abaqus/Explicit 6.9 Extended Functionality

Analysis Types

- Nonlinear dynamic stress/displacement
- Acoustics
- Adiabatic stress
- Coupled Eulerian-Lagrangian
- Coupled field
 - Thermo-mechanical
 - Shock and acoustic-structural

Analysis and Modeling Techniques

- Import
- Restart
- Recover
- Automated mass scaling
- Nonstructural mass
- Adaptive meshing
- Tracer particles
- Steady-state detection
- Submodeling
- Parameterization and parametric studies
- Cosimulation
- Subcycling
- Hydrostatic fluid modeling
- Surface-based fluid cavities
- Meshed beam cross-sections
- Annealing
- Automatic perturbation of geometry
- Local degrees of freedom
- Reinforcements
- Embedded elements
- Display bodies
- User subroutines

Parallel Execution

- Domain decomposition-based parallel processing
- Available on both shared memory and distributed memory parallel (cluster) systems

Material Definitions

Elastic Mechanical Properties

- Linear elasticity
- Orthotropic and anisotropic linear elasticity
- Hyperelasticity (including permanent set)
- Anisotropic hyperelasticity
- Elastomeric foam
- Low-density foam
- Fabric
- Mullins effect
- Time-domain viscoelasticity
- Equation of state

Inelastic Mechanical Properties

- Metal plasticity
 - Isotropic and anisotropic yield
 - Isotropic and kinematic hardening
 - Rate-dependent yield
 - Porous metal plasticity
 - Annealing or melting
 - Johnson-Cook plasticity
- Progressive damage and failure
 - Ductile
 - Shear
 - Forming limit diagram (FLD)
 - Forming limit stress diagram (FLSD)
 - Müschenborn-Sonne forming limit diagram (MSFLD)
 - Marciniak-Kuczynski (M-K) criteria
 - Hashin unidirectional composite
- Extended Drucker-Prager plasticity
- Modified Drucker-Prager/Cap plasticity
- Cam-Clay plasticity
- Mohr-Coulomb plasticity
- Crushable foam plasticity
- Concrete
 - Brittle cracking
 - Damaged plasticity

Additional Material Properties

- Density
- Material damping
- Thermal expansion
- Heat transfer properties
 - Thermal conductivity
 - Specific heat
 - Latent heat
- Acoustic medium properties
 - Bulk modulus
 - Volumetric drag
 - Cavitation limit
- Hydrostatic fluid properties
 - Hydraulic fluids
 - Pneumatic fluids
- Viscous shear behavior for fluids
- User materials

Element Library

Continuum

- Stress analysis
 - 2-D (plane stress and plane strain)
 - 3-D
 - Axisymmetric
 - Infinite
- Acoustic
 - 2-D
 - 3-D
 - Axisymmetric
 - Infinite

- Coupled temperature-displacement
 - 2-D (plane stress and plane strain)
 - 3-D
 - Axisymmetric

Structural

- Stress analysis
 - Membrane (3-D)
 - Truss (2-D and 3-D)
 - Beams (2-D and 3-D)
 - Shells (3-D, 3-D continuum, and axisymmetric)

Inertial Elements

- Stress analysis
 - Point mass (2-D and 3-D)
 - Rotary inertia (2-D and 3-D)

Special-Purpose Elements

- Surface elements
- Hydrostatic fluid elements
- Rigid elements
- User elements
- Capacitance elements
- Connector elements
- Cohesive elements
- Springs and dashpots

Prescribed Conditions

- Amplitude curves
- Initial conditions
- Boundary conditions
- Loads
 - Distributed
 - Surface tractions
 - Concentrated forces and moments
 - Follower forces
 - Thermal
 - Acoustic
 - Predefined fields
 - User-defined
- Sensors and actuators

Constraints and Interactions

Kinematic Constraints

- Linear constraint equations
- General multi-point constraints
- Surface-based constraints
 - Mesh ties
 - Kinematic and distributing couplings
 - Shell-to-solid couplings
 - Mesh-independent fasteners
- Embedded elements



Contact Modeling

- General (“automatic”) contact
- Surface-based contact pairs
- Contact interactions
 - 2-D and 3-D
 - Deformable-deformable contact
 - Deformable-rigid contact
 - Rigid-rigid contact
 - Self-contact
 - Eroding contact
 - Edge-to-edge contact
- Mechanical contact properties
 - Hard contact
 - Soft contact
 - Contact damping
 - Static and kinetic Coulomb friction
 - User-defined friction models
 - Breakable bonds
 - Cohesive behavior
- Thermal contact properties
- User-defined interfacial constitutive behavior
- Surface property definitions
 - Surface thickness
 - Feature edges
 - Offsets
- Contact formulations
 - Penalty and kinematic contact
 - Balanced or pure master-slave contact

Input

- Keywords
- Set concept
- Multiple coordinate systems
- Parts and assemblies

Output

- Interactive graphical postprocessing
- Platform-neutral output database
- Restart output
- Diagnostic messages
- Scripting interface

Supported Platforms

- Windows/x86-32
- Windows/x86-64
- Linux/x86-32
- Linux/x86-64

- Linux/Itanium
- HP-UX/Itanium
- AIX/Power

Documentation

- Analysis User’s Manual
- Keywords Manual
- Getting Started Manual
- Example Problems Manual
- Benchmarks Manual
- Verification Manual
- Theory Manual
- Release Notes

Product Support

- Maintenance and support
- Quality Monitoring Service
- Installation
- Training and users’ meetings

Related Products

Dummy Models

- Crash test dummy models for use in crashworthiness and occupant safety simulations
- The models are in SI units and include accelerometers (nodes), load cells (beams), and transducers (connectors) for extraction of occupant injury criteria

Interface Products

- Enable the use of Abaqus/Explicit with complementary software from third-party suppliers in areas such as plastics injection molding

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