

Abaqus/Standard

Version 6.7

Analysis Types**General, Linear, and Nonlinear Analyses**

- Static stress/displacement
- Direct cyclic
- Viscoelastic/viscoplastic response
- Dynamic stress/displacement
- Steady-state transport
- Heat transfer (transient and steady-state)
- Mass diffusion (transient and steady-state)
- Acoustics
- Coupled field
- Multiphysics
 - Thermo-mechanical
 - Thermo-electrical
 - Piezoelectric
 - Pore fluid flow-mechanical
 - Shock and acoustic-structural

Linear Perturbation Analyses

- Static stress/displacement
 - Linear static
 - Eigenvalue buckling
- Dynamic stress/displacement
 - Natural frequency extraction
 - Complex eigenvalue extraction
 - Modal superposition
 - Transient steady-state
 - Response spectrum
 - Random response

Analysis and Modeling Techniques

- Import
- Restart
- Substructuring
- Submodeling
- Material removal and addition
- Mesh-to-mesh solution mapping
- Adaptive remeshing
- Fracture mechanics
- Symmetric model generation and results transfer
- Cyclic symmetry
- Inertia relief
- Nonstructural mass
- Direct matrix input
- Co-simulation
- Automatic resolution of overconstraints
- Data parameterization and parametric studies
- Automatic perturbation of geometry
- Local degrees of freedom
- Hydrostatic fluid cavities
- Annealing
- Reinforcements
- Embedded elements

- Elastic formulation
- Meshed beam cross-sections
- Rigid, display, and isothermal bodies

Solution Techniques

- Parallel execution on both shared memory and distributed memory parallel (clusters) systems
- Parallel direct sparse solver with dynamic load balancing
- Domain decomposition-based parallel iterative solver
- Parallel Lanczos eigenvalue solution
- Parallel element operations
- Multiple load cases
- Full Newton and quasi-Newton methods

Material Definitions**Elastic Mechanical Properties**

- Linear elasticity
 - Plane stress orthotropic failure
- Porous elasticity
- Hypoelasticity
- Hyperelasticity
- Elastomeric foam
- Mullins effect
- Viscoelasticity
- Hysteresis

Inelastic Mechanical Properties

- Metal plasticity
 - Isotropic and anisotropic yield criteria
 - Isotropic, kinematic, and ORNL hardening
 - Porous metal plasticity
 - Cast iron
 - Two-layer viscoplasticity
 - Creep
 - Volumetric swelling
 - Deformation plasticity
- Extended Drucker-Prager plasticity
- Capped Drucker-Prager plasticity
- Cam-clay plasticity
- Mohr-Coulomb plasticity
- Crushable foam plasticity
- Jointed materials
- Concrete
- Damage and failure for fiber-reinforced composites

Additional Material Properties

- Density
- Material damping
- Thermal expansion
- Thermal and electrical conductivity
- Specific heat
- Latent heat

- Damage and failure for fiber-reinforced composites
- Piezoelectric properties
- Acoustic medium properties
 - Bulk modulus
 - Volumetric drag
- Hydrostatic fluid properties
 - Hydraulic fluids
 - Pneumatic fluids
- Mass diffusion properties
 - Diffusivity
 - Solubility
- Pore fluid flow properties
 - Permeability
 - Porous bulk moduli
 - Absorption/exsorption
 - Swelling gel
 - Moisture swelling
- User materials

Element Library**Continuum**

- Stress analysis 2-D (plane stress, plane strain, generalized plane strain);
- 3-D (regular, variable node); cylindrical, axisymmetric (with and without twist); axisymmetric with nonlinear, asymmetric deformation; infinite; warping
- Heat transfer 1-D, 2-D, 3-D, axisymmetric
- Mass diffusion 2-D, 3-D, axisymmetric
- Temperature-displacement 2-D (plane stress, plane strain, generalized plane strain), 3-D, axisymmetric (with and without twist)
- Pore pressure 2-D (plane strain); 3-D; axisymmetric; axisymmetric with nonlinear, asymmetric deformation
- Piezoelectric 2-D (plane stress, plane strain); 3-D; axisymmetric; axisymmetric with nonlinear, asymmetric deformation
- Thermal-electrical 1-D, 2-D, 3-D, axisymmetric
- Acoustic 1-D, 2-D, 3-D, axisymmetric, infinite

Shells

- Stress analysis 3-D, continuum shell; axisymmetric; axisymmetric with nonlinear, asymmetric deformation
- Heat transfer 3-D, axisymmetric
- Temperature-displacement 3-D, axisymmetric

Membranes

- Stress analysis 3-D, cylindrical, axisymmetric (with and without twist)



Beams

- Stress analysis 2-D, 3-D (regular and open section)

Pipes

- Stress analysis 2-D, 3-D

Elbows

- Stress analysis 3-D

Frame Elements

- Stress analysis 2-D, 3-D

Trusses

- Stress analysis 2-D, 3-D
- Temperature-displacement 2-D, 3-D
- Piezoelectric 2-D, 3-D

Gasket Elements

- Stress analysis 2-D (plane stress, plane strain), 3-D, axisymmetric

Inertial Elements

- Stress analysis Point mass, rotary inertia

Rigid Elements

- Stress analysis 2-D, 3-D

Capacitance Elements

- Heat transfer Point heat capacitance

Connector Elements

- Stress analysis 2-D, 3-D

Cohesive Elements

- Stress analysis 2-D, 3-D

Springs, Dashpots, Flexible Joints

- Stress analysis 2-D, 3-D
- Pore pressure 2-D, 3-D

Distributing Coupling

- Stress analysis 2-D, 3-D

Special-Purpose Elements

- Surface elements
- Hydrostatic fluid elements
- Tube support elements
- Line spring elements
- Pipe-soil interaction elements
- Acoustic interface elements

User-Defined Elements

- Provides users the ability to define custom elements

Prescribed Conditions

- Amplitude curves
- Initial conditions
- Boundary conditions
- Loads
 - Distributed
 - Surface tractions
 - Concentrated forces and moments
 - Follower forces
 - Thermal
 - Electrical
 - Acoustic
 - Pore fluid flow
 - Prescribed assembly loads
 - Predefined fields
 - User-defined

Constraints and Interactions**Kinematic Constraints**

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

Surface-Based Contact Modeling

- Contact interactions
 - 2-D, 3-D
 - Deformable-deformable contact
 - Rigid-rigid contact
 - Self-contact
- Contact formulations
 - Balanced or pure master-slave contact
 - Finite, small, and infinitesimal sliding
- Mechanical contact properties
 - Penalty contact
 - Hard contact with classical Lagrange multiplier method
 - Hard contact with augmented Lagrangian method
 - Contact damping
 - Static and kinetic Coulomb friction
 - Anisotropic friction
 - User-defined friction models
 - Pressure penetration
 - Debonding
 - Thermal conductance and radiation contact properties
- Electrical contact properties
- Pore fluid contact properties
- User-defined interfacial constitutive behavior

Element-Based Contact Modeling

- Gap contact elements
 - Mechanical and thermal

Cavity Radiation

- 2-D, 3-D, axisymmetric
- Closed and open cavities
- Symmetry and surface blocking
- Surface motion with automatic viewfactor computations
- Surface radiation properties

User Subroutines

- Over 40 user-defined subroutines

Additional Features

- Drag chains
- "Spud can" joint elements
- Tube-in-tube slide lines

Input

- Keywords
- Set concept
- Multiple coordinate systems
- Parts and assemblies
- NASTRAN bulk data

Output

- Interactive graphical postprocessing
- Platform-neutral output database
- Printed output
- External file output
- Restart output
- Diagnostic messages
- NASTRAN output2
- Scripting interface

Hardware Compatibility

- Linux/x86-32
- Windows/x86-32
- HP-UX/Itanium
- Linux/Itanium
- Linux/x86-64
- AIX/Power
- HP-UX/PA-RISC
- Windows/x86-64
- IRIX/MIPS

Documentation

- Analysis User's Manual
- Keywords Manual
- Tutorials
- Example Problems Manual
- Benchmarks Manual
- Verification Manual
- Theory Manual
- Interfaces User's Manuals
- Release Notes



Product Support

- Maintenance and Support
- Quality Monitoring Service
- Installation
- Training & Users' Meetings

Related Products**Abaqus/AMS**

- High-performance automatic multi-level substructuring eigensolver

Abaqus/Design

- Design sensitivity analysis
- Sensitivities with respect to shape and material parameters
- Nonlinear geometric effects

Abaqus/Aqua**Surrounding Medium**

- Fluid profile
- Wave profile
- Wind profile

Loading

- Drag loading
- Buoyancy loading
- Inertia loading

VCCT for Abaqus

- Advanced capabilities to analyze damage tolerance of composite structures, including predictions of the onset and the growth of delaminations

Interface Products

- Enables the use of ABAQUS/Standard with complementary software from third-party suppliers in areas such as plastics injection molding and multibody dynamics

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