

Abaqus/CAE 6.9 Extended Functionality

Geometry

Geometry Creation Tools

- Solid features
 - Extrude
 - Loft
 - Revolve
 - Sweep
 - Draft, twist, and pitch
 - Fillet/chamfer
- Cut features
 - Extrude
 - Loft
 - Revolve
 - Sweep
 - Circular hole
- Shell features
 - Planar surface
 - Extrude
 - Loft
 - Revolve
 - Sweep
 - Fillet/chamfer
- Wire features
 - Planar
 - Poly line
 - Spline
 - Fillet
- Datum geometry
- Partitioning tools
 - Edge
 - Face
 - Cell

2-D Sketcher

- Point
- Line
- Circle
- Rectangle
- Arc
- Fillet
- Spline
- Ellipse

Sketch Tools and Options

- Constraints
- Parameters
- Translate/rotate/mirror/scale
- Trim/extend/break/merge
- Project edges
- Offset entities
- Linear/radial pattern
- Dimensioning
- Construction geometry
- Sketch origin placement
- Sketch cleanup
- Sketch import/export

Geometry Import/Export

- CAD Associative Interfaces (add-on modules)
 - CATIA V5
 - SolidWorks
 - Pro/ENGINEER
 - CAD feature parameter update
- CAD geometry translators (add-on modules)
 - CATIA V4
 - I-deas NX
 - Parasolid
- Assembly import
- Neutral format import
 - SAT, IGES, STEP, or VDA
- Import of parts from Abaqus input (.inp) files or output database (.odb) files
- Geometry export
 - SAT, IGES, STEP, or VDA

Model Import/Export

- Model database (.cae) files
- Models from Abaqus input (.inp) files
- Nastran bulk data files
- Ansys input file import

Geometry Repair Tools

- Automated repair during import
- Repair small edges
- Merge edges
- Repair invalid edges
- Remove redundant entities
- Repair small faces
- Replace faces
- Repair sliver
- Remove faces
- Create face
- Solid from shell
- Stitch edges
- Repair face normals
- Convert to analytical
- Convert to precise

Assembly

Instance Tools

- Create/suppress/resume/delete
- Linear/radial pattern
- Translate/rotate
- Replace
- Query

Merge/Cut Tools

- Geometric parts
- Merge orphan mesh

Sets and Surfaces

- Geometric sets containing vertices, edges, faces, skins, or cells
- Orphan mesh sets containing nodes or elements

- Native mesh sets and surfaces
- Surface regions
- Merge sets/surfaces

Model Display

- Display groups
- Selection tools
- Pick filters
- Translucency control

Color Coding

- Display model geometry and mesh elements in configurable colors
- Color by attribute

Properties

Material Models

- General
- Elasticity
- Electrical properties
- Mass diffusion
- Plasticity
- Pore fluid properties
- Thermal properties
- Gasket
- Acoustic medium
- Damage initiation criteria and evolution
- Brittle cracking
- Equation of state (EOS) materials
- User materials
- Hyperelastic/viscoelastic material evaluation

Materials Management

- User libraries

Sections

- Solid
 - Homogeneous
 - Composite
 - Eulerian
 - Generalized plane strain
- Shell
 - Homogeneous
 - Composite
 - Membrane
 - Surface (rebar layers)
 - Shell offset
- Beam
 - Beam
 - Truss
 - Other
 - Gasket
 - Cohesive
- Gasket
- Beam section profiles
 - Profile library
 - Arbitrary
 - Generalized



Composites

- Ply layup definition and management
- Layer orientation and thickness distributions
- Ply stack plots
- Classic laminate theory
- Nonlinear progressive damage and failure
- Ply-based output request

Orientations

- Beam section
- Material
- Rebar
- Shell normal
- Surface- and direction-based

Special Engineering Features

- Fasteners
 - Point-based
 - Discrete
 - Points import and definition
 - Projection, offset, and patterning tools
- Skins and stringers
- Inertia
 - Point mass/inertia
 - Nonstructural mass
 - Heat capacitance
- Springs/dashpots

Analysis Support

General, Linear, and Nonlinear Analyses

- Static stress/displacement analysis
- Viscoelastic/viscoplastic response
- Dynamic stress/displacement analysis
- Heat transfer analysis (transient and steady-state)
- Mass diffusion analysis (transient and steady-state)
- Direct cyclic
 - Low-cycle fatigue
- Acoustic analysis
- Coupled problems
 - Thermo-mechanical
 - Thermo-electrical
 - Piezoelectric
 - Pore fluid flow-mechanical
 - Thermo-mechanical mass diffusion
 - Shock and acoustic-structural
- Abaqus/Standard to Abaqus/Explicit cosimulation

Linear Perturbation Analyses

- Static stress/displacement analysis
 - Linear static stress/displacement analysis
 - Eigenvalue buckling estimates
- Dynamic stress/displacement analysis
 - Natural frequency extraction
 - Complex eigenvalue extraction
 - Transient response via modal superposition
 - Steady-state response to harmonic loading
 - Response spectrum analysis
 - Random response analysis

Multi-Step Setup

- Step suppression

Analysis Controls

- General solution controls
- Solver controls
- Adaptive mesh domain
- Adaptive mesh controls

Output Requests

- Field output
- History output
- Integrated output sections
- Contact status output
- Restart, diagnostic, and monitor output
- Sensors

Constraints and Interactions

Contact

- Automatic contact detection and setup
- General contact (Abaqus/Standard and Abaqus/Explicit)
- Surface-to-surface contact
- Self-contact
- Contact deactivation/reactivation

Contact Properties

- Mechanical
 - Normal
 - Tangent
 - Damping
 - Clearance-dependent
 - Surface-based cohesive contact and damage
- Thermal
 - Conductance
 - Heat generation
 - Boundary radiation
- Film coefficient

Interactions

- Cyclic symmetry
- Cavity/surface radiation
- Surface/concentrated film condition
- Elastic foundations
- Acoustic impedance
- Actuator/sensor
- Model change

Constraints

- Tied surfaces
- Equations
- Display body
- Rigid and isothermal bodies
- Coupling
- Multi-point constraints
- Shell-to-solid coupling
- Embedded regions

Connectors

- Basic
 - Translational
 - Rotational
- Assembled/complex
- Connector builder to easily define connectors

Boundary Conditions

- Nodal
- Velocity
- Acceleration
- Velocity/angular velocity
- Submodel
- Pore pressure
- Electric potential
- Temperatures
- Predefined fields
- Initial state (from previous analysis)
- Spatially varying boundary conditions
- Eulerian (inflow/outflow/motion)

Loads

- Mechanical
- Bolt load
- Thermal
- Acoustic
- Fluid
- Electrical
- Mass diffusion
- Fields
- Multiple load cases
- Spatially varying loads

Analytical and Discrete Fields

- Analytical fields for prescribed conditions
- Discrete fields for prescribed conditions, orientations, offset, and shell thicknesses
 - Volume fraction discrete field

Amplitude Curves

- Tabular
- Equally-spaced
- Periodic
- Modulated
- Decay
- Solution-dependent
- Smooth-step
- Actuator
- User

Fracture Mechanics

- Contour integral
- Extended finite element method (XFEM)



