ABAQUS/CAE 2017 DATA SHEET

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
  - From edge
- Mirror feature
- 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 V6
  - 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 files
  - Input (.inp)
  - Output database (.odb)
- Linear dynamics (substructure) data (.sim)
- Geometry export
  - SAT, IGES, STEP, or VDA

Model Import/Export
- Model database (.cae) files
- Models from Abaqus input (.inp) files
- Nastran bulk data files
- ABAQUS input file import
- Wavefront (.obj) export

Model Import/Export (geometry edit tools)
- Automated repair during import
- Stitch edges
- Repair small/invalid edges
- Merge edges
- Remove redundant entities
- Remove wire edges
- Remove/cover/replace faces
- Repair small faces/slivers/faces normals
- Offset faces
- Extend faces
- Blend faces
- Solid from shell
- Convert to analytical
- Convert to precise
- Faces from element faces

Midsurfacing
- Offset/extend/blend faces (geometry edit tools)
- Assign thickness and offset

ASSEMBLY
Instance Tools
- Create/suppress/resume/delete
- Linear/radial pattern
- Translate/rotate
- Replace
- Model instanting

Merge/Cut Tools
- Geometric parts
- Merge orphan mesh
- Merge geometric and orphan mesh parts

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
  - Union
  - Intersection
  - Difference

Model Display
- Display groups
- Selection tools
- Pick filters
- Translucency control
- View cuts
- View center setting

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

PROPERTIES
Material Models
- General
- Elasticity
- Electrical properties
- Mass diffusion
- Magnetic properties
- Plasticity
- Electromagnetic properties
- 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
- Anisotropic hyperelasticity

Materials Management and Calibration
- User libraries
- Import/process test data and define calibration behaviors

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
  - Tapered
ABAQUS/CAE 2017 DATA SHEET

- Fluid section
- Beam profile and shell thickness rendering
- Electromagnetic, solid section

**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

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

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

**Queries**
- Point/node/distance/angle
- Geometry diagnostics
- Section assignment

**ANALYSIS FEATURES**

**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
- Coupled thermal-electrical-structural
- Pore fluid flow-mechanical
- Thermo-mechanical mass diffusion
- Shock and acoustic structural
- Cosimulation
  - ABAQUS/Standard to ABAQUS/Explicit cosimulation
  - ABAQUS/CFD to ABAQUS/Standard or ABAQUS/Explicit
  - Fluid structure interaction (FSI)
  - Conjugate heat transfer (CHT)
- Flow analysis
  - Incompressible
  - Laminar and turbulent

**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
- Substructure Generation
- Electromagnetic, time harmonic

**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
  - VCCT for ABAQUS/Standard
  - Thermal
    - Conductance
    - Heat generation
    - Boundary radiation
  - Film coefficient

**Interactions**
- Cyclic symmetry
- Cavity/surface radiation
- Surface/concentrated film condition
- Elastic foundations
- Acoustic impedance
- Actuator/sensor
- XFEM crack growth
- Model change
- Pressure penetration
- ABAQUS/Standard-ABAQUS/Explicit co-simulation boundary
- Fluid-Structure co-simulation boundary
- Fluid cavity

**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 and coincident builder

**Boundary Conditions**
- Nodal
  - Velocity
  - Acceleration
  - Velocity/angular velocity
  - Submodel
  - Pore pressure
  - Electric potential
  - Temperatures
  - Fluid inlet/outlet
  - Fluid wall condition
  - Spatially varying boundary conditions
  - Eulerian (inflow/outflow/motion)
  - Magnetic
  - Electromagnetic loads

**Predefined fields**
- Velocity/Temperature/Hardening
- Initial state (from previous analysis)
- Material assignment
- Fluid density/thermal energy/turbulence/velocity
- Initial stress
- Geostatic stress/void ratio/saturation/pore pressure

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

**Analytical and Discrete Fields**
- Analytical fields for prescribed conditions
- Mapped fields
- 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)
- Seams and cracks

**MESHING**
- Mesh Seeding
  - Global seed size
- Curvature-based refinement
- Minimum element size
  - Edge seed
  - Uniform
  - Biased
  - By size
  - By number

**Structured Meshing**
- Automatic quadrilateral meshing
  - Medial axis
- Advancing front
- Automatic triangular meshing
- Mapped meshing
- Mesh stack orientation

**Surface Meshing**
- Convert triangular elements to tetrahedral elements
- Refine 2-D planar meshes

**Adaptive Remeshing**
- Automatic and manual

**Element Library**
- Beam
- Truss
- Connector
- Shell
- Membrane
- Cohesive
- Continuum shell
- Continuum
- Elbow
- Gasket
- Pipe
- Eulerian
- Cylindrical
- Fluid
- Electromagnetic

**JOB MANAGEMENT**
- Submission
- Parallel computing options
- Restart
- Monitor and view job files
- Co-execution
  - Abaqus/Standard to Abaqus/Explicit
  - Abaqus/CFD to Abaqus/Standard or Abaqus/Explicit

**Visualization of Model and Output Data**
- Model plotting
- Model and results data
- Deformed, contour, vector/tensor, path, extreme value, ply-stack, through thickness, tick mark, overlap, material orientation, and X-Y plots
- Loads display
- View manipulation, linked viewports, view center setting and camera options
- Multiple viewports and view synchronization
- Automatic color coding
- View cuts
  - Planar/cylindrical/spherical
  - Isosurface
  - Resultant force/moment output
  - Multiple cuts
  - Free bodies at all view cuts
  - Beam profile and shell thickness display
  - Results display on beam sections
  - Free-body cuts
  - Nodal force plot, history plot and multiple free-body display
  - Animations
  - Movie import/export and overlay
  - Mirroring and patterning of symmetric models
  - Failed element removal
  - Stress linearization
  - Streamlines
  - X-Y data operators and data filtering
  - Tabular data reports
  - Probe/query tools and annotations
  - Network connection to remote output databases
  - Diagnostics and constraints visualization
  - Automatic report generation
  - Abaqus/Aqua gravity wave visualization
  - DEM visualization

**Related Products**
- Abaqus/CAE Topology Optimization Module (ATOM), CAD Associative Interfaces, and Geometry Translators
  - CAD Associative interfaces for CATIA V6, CATIA V5, SolidWorks, and Pro/ENGINEER
  - Enables synchronization of CAD and CFD assemblies and seamless updates
  - Geometry translators for CATIA V4, I-deas NX, and Parasolid

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

**Getting Started Manual**
- Release Notes

**Supported Platforms**
- Windows/x86-64
- Linux/x86-64

**Plug-Ins**
- Examples
  - Interactive plug-in GUI builder (RSG)
  - Script upgrade
  - Excel utilities
  - NVH postprocessing
  - Adaptivity plotter
  - ODB combine tool
  - STL import/export

**Printing and Output**
- PS/EPS/PNG/TIFF/SVG
- 3D XML/VRML
- Hardcopy

**Documentation and Online Help**
- User’s Manual
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