sonar data sheet

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OPERATION SYSTEM

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

SOFTWARE

- sonar-LAB : model-definition software divided in a basic module and some additional industry-sector-specific modules
- sonar-SIM : universal simulation execution software

USER INTERFACE

- MS Windows-graphical user interface

DEVELOPMENT SYSTEM

- Microsoft Visual Studio
- sonar-LAB: C#
- sonar-SIM: C-code

PARALLEL EXECUTION

- shared memory parallel system (openMP)

ANALYSIS METHOD

- Nonlinear dynamic force/stress displacement
- clean explicit code

MODEL DISPLAY

- 2D-Views (Front, Side, Top)
- 3D-Views (openGL)

MODELING TECHNIQUES

- primitive objects
- groups / grids and clusters of primitives linked elastically
- Clusters of Particles
- Semifinished products
- Import drawing data
- Graphical UI
- Macro Language
- Control Systems
- Modifying, Scaling, Perturbating models
- Tolerance studies
- Functions for special materials (e.g. fabrics)
- Merging Library-models, -groups, -parts

GEOMETRY CREATION TOOLS

- Import Tools
- direct interactive graphical user interface
- dialog oriented Tools
- macro Tools (sonar script)

DIALOG TOOLS

- a large collection of standard Dialogs for all aspects of the interface

FORCES

- Link Forces between primitives
- Contact-/ Collision-/ Interaction- forces
- Isotropic gravitation field (Laboratory scale)
- Central gravitation field (astronom.dimensions)
- Friction (bilateral, unilateral, global)
- Forces by Point curves
- Forces by Formulas
- Forces and Fields by Control Systems
- Forces by sonar Script
- Viscosity (particles)
- Perturbation forces

MATERIAL PROPERTIES

- Collection of material models (stress/strain)
- Collection of material functions (e.g. Johnson-Cook)
- Yield and Break-up properties
- plasticity, hardening, weakening
- Interaction properties, absorption factor, damping
- friction properties
- viscosity properties (particles)
- special materials (e.g. concrete)

RAWDATA

- Point
- Line
- Arc
- Circle
- Polyline
- Polygon
- Quadstrip
- Line-Arc-Contour

3D-OBJECTS, OBJECTGROUPS

- Primitives
- Fixpoints
- Actuators
- Dampers
- Tension Links
- Bending Links
- Torsion Links
- Math. Springs
- Phys. Springs

3D-PRIMITIVES

- Sphere
- Cylinder
- Cuboid
- Prism
- Extruded Polygon-/ Quadstrip- or Line-Arc-Contour (with optional holes)
- Rotated Polygon-/ Quadstrip- or Line-Arc-Contour
- Tube
- Tube Segment
- Tube Shell
- Torus
- Torus Segment
- (Polyhedron)
- Planes (2D)
- Grid surfaces

3D-SPRINGS

- Helical Tension Spring (math./ physical)
- Helical Compression Spring (math./physical)
- physical Leaf Spring
- physical Spiral Spring
- for more springs use the Spring Module

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STRUCTURAL ANALYSIS

- dynamic structural analysis of any arbitrary object combination (cluster of primitives)

CONTACT / INTERACTION

- general full automatic contact and interaction detection and calculation
- explicite Interaction depth/force method
- unlimited multi-contact treatment
- unlimited hardness / weakness
- different interaction modification methods
- bilateral Rules
- active/passive objects
- rules by object names
- interaction restrictions by direction
- contact functions
- contact hysteresis
- contact friction

LINKS

- object-object-Links
- object-fixpoint-Links
- tension-, bending-, -torsion-Links
- glue-Links
- linear and non-linear force characteristic
- linear and non-linear damping
- Link Combinations for all sort of connections
- elastic-plastic behavior
- Links are automatically controlled by material models
- different break-up features (visual, acoustic, signal, message, logfile)
- Simulation of partially broken models

SIMULATION

- real and consequent explicit calculation
- consecutive automatic timestep calculation
- unlimited stop & go
- unlimited changes in a running simulation
- remote control by sonar script
- event driven stop & go

SONAR SCRIPT

- Interpreter Language
- used as Macro-, Control System- and Command-Language
- P-Compiler

OUTPUT / RECORDING

continuously updated…

- graphical displays
- Data export
- Quicktime movies
- Logfiles

MODULES

- Chain Module
- Cable Module
- Profile Module
- Spring Module
- Textile Module
- Particle Module
- Rockfall Module

DOCUMENTATION

- sonar Tutorial
- sonar script Language Guide
- sonar Samples
- sonar simulation stories
- sonar in a nutshell - Dialogs & Tools
- sonar in a nutshell - program functionality

PRODUCT SUPPORT

- Installation
- Maintanance & support
- Training & users' meetings