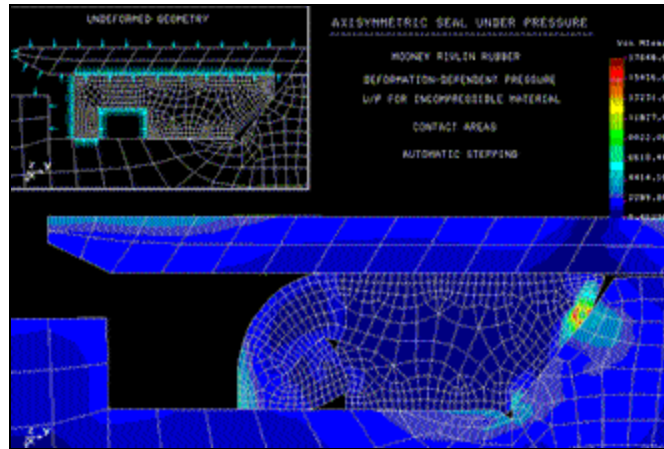


NSTAR



Axisymmetric Rubber Seal Under Pressure

NSTAR provides a large array of nonlinear analysis capabilities that make it possible for you to analyze complex nonlinear problems on the desktop, at a fraction of mainframe system costs.

Modeling Nonlinear Problems

The NSTAR module has recently been upgraded to include a number of new features such as:

- The capability to handle any size problem with no limit on the mesh size. In the case of contact models, there is virtually no limit on the number of line or surface contact areas.
- A direct solver that uses sparse matrix technology and advanced reordering techniques to speed up the force-stiffness solution. This new solver is far more efficient than the conventional direct methods.
- A new Iterative solver technique that is recommended primarily for "large" models. With this new solver, results are obtained orders of magnitude faster than direct procedures.
- Improvements in the program diagnostic message output to help the user determine more quickly the problem sources. And much more...

with geometric and material nonlinearities. These include large deflection, large strain, plasticity, creep, thermo-plasticity and viscoelasticity. You can also study nonlinear contact problems involving surface interactions of 3D models with or without friction.

NSTAR has been designed to provide you with many helpful hints and suggestions on the choice of options and parameters during the analysis process. In this way, you will minimize trial and error solutions that are generally prevalent in nonlinear analysis problems. The program's powerful restart option eliminates the need to repeat lengthy time-step recalculations if for any reason the program stops before obtaining the final solution.

NSTAR is included in most Intermediate COSMOS/™ product bundles. You can also use NSTAR as a stand-alone system with GEOSTAR, COSMOS/'s fast, graphics-driven pre- and postprocessor, or in combination with other COSMOS/ modules to give you an affordable solution.

NSTAR gives you real-life insight into the way your complex designs will work under their real operating conditions — quickly, and cost-effectively.

Nonlinear Analysis

With NSTAR, you may analyze nonlinear static and dynamic problems

SPECIFICATIONS

NSTAR

DESCRIPTION

NSTAR performs 2D and 3D nonlinear static and dynamic analysis, including large displacements, plasticity, hyperelasticity, viscoelasticity, creep, nonlinear thermal and post buckling analyses.

MODELING FEATURES

ELEMENT LIBRARY

- 2D isoparametric elements (plane stress, plane strain and solid of revolution)
- 2D and 3D trusses
- 2D and 3D beams
- Triangular thin and thick shells
- Quadrilateral thin and thick shells
- 3D tetrahedra
- 3D isoparametric solids
- Hybrid solid
- Nonlinear spring
- General mass
- Contact (with or without friction)
- Composites
- Immersed cable element
- Automatic evaluation of the neutral surfaces for composite shells
- Translational/rotational spring element

MATERIAL MODELS

- Isotropic
- Orthotropic
- von Mises, Tresca and Drucker-Prager yield
- Elasto-plastic & perfectly plastic
- Isotropic/kinematic hardening
- Incompressible materials
- Treatment of hydrostatic pressure for incompressible materials (rubber, large-strain plasticity)
- Nonlinear elastic
- Higher order Mooney-Rivlin hyperelastic
- Ogden hyperelastic
- Temperature dependent properties
- Thermoplasticity
- Creep
- Viscoelasticity (Maxwell model)
- User-defined material models
- Large-strain plasticity
- Concrete model
- Temperature-dependent creep
- Blatz-Ko material model
- User-defined creep laws
- Evaluation of material constants from curve data

LOADS

- Deformation-dependent pressure/Centrifugal
- Concentrated (forces and moments)
- Pressure: beam, plane2D, shells and solids
- Gravitational, centrifugal and thermal
- Base motion
- Prescribed displacements (Allows for release durations)

ANALYSIS FEATURES

- Latest solver technologies
- Static & dynamic analysis
- Large deflections and large strains
- 2D/3D contact of bodies (& friction)
- Automatic generation of contact surfaces/lines based on geometric entities
- Adaptive automatic stepping
- Restart
- Damping and base motion
- 2D J-integral evaluation for nonlinear fracture mechanics (plasticity, creep & thermal)
- Prescribed displacements/constraints in local coordinate systems
- Linear constraint equations, general constraint equations and joint-bond constraints
- Nonlinear frequency analysis
- Nonlinear buckling analysis
- Triangular contact surfaces
- Limit load & Post-limit load analysis
- Thermal buckling
- Snap-through/snap-back buckling
- Different solution controls (force/displacement/arc length)

RESULTS

OUTPUT VALUES

- Displacements and rotations
- Stresses: normal, shear, principal, von Mises, and stress intensity
- Strains: total, thermal, creep & plastic
- Internal forces for shells and beams
- Reaction forces

DISPLAYS

- Displacement, stress and strain contours, and deformed shape plots
- X-Y graphs for response vs. time or load factor or reaction force
- Tabular data reports
- X-Y graphs for stress vs. time

NUMERICAL TECHNIQUES

- Total and updated Lagrangian
- Load and displacement controls

- Riks Arc Length technique
- Implicit direct time integration (Newmark-Beta & Wilson-Theta)
- Explicit direct time integration (modified central difference)
- Newton Raphson iterations
- Modified Newton Raphson iterations
- BFGS method
- Line search option
- Adaptive automatic stepping
- Incremental-iterative procedure
- User defined load steps
- Step-by-step solution for initial interferences
- Convergence checks
- Restart option
- Direct sparse matrix solver
- Iterative solver

USER INTERFACE

- Direct use of HSTAR, ESTAR and FLOWPLUS results
- Integrated with GEOSTAR for model creation and results display
- Automatic node renumbering

SYSTEM REQUIREMENTS

- Windows 9X or NT systems (for Unix platforms, please inquire)
- 64 MB RAM minimum, 128 MB RAM recommended
- 200 MB disk space minimum
- CD-ROM drive

OPTIONS

- Maintenance: hotline support, program updates and QA reports
- Training: Introductory and Advanced
- FEA Translators: NASTRAN®, ANSYS®, PATRAN®, I-DEAS® and SINDA®
- COSMOS/M Database Utility for accessing the COSMOS/M database
- AISC code checking
- Windows NT & EWS network option

COSMOS/M

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