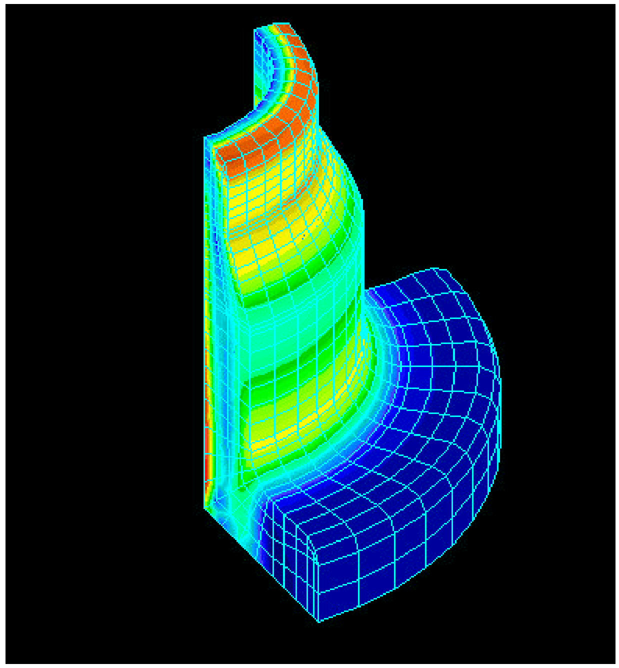
HSTAR



Temperature changes encountered by mechanical parts and structures in their normal operating conditions can influence a product's performance and lifespan. HSTAR, COSMOS/M's heat transfer module is a general-purpose heat transfer analysis code which provides a simple yet powerful approach for performing thermal analysis on part or assembly models.

Modeling Thermal Problems

HSTAR helps you model real-world time and temperature-dependent loads and boundary conditions quickly and accurately. It gives you the ability to analyze thermo-electric coupling to determine the effect of Joule heating on temperature distribution, and element current loading.

A new 3D forced convection Hydraulic link element (FLUIDT) handles fluid flow through thermal solids with the ability to conduct heat within the fluid, such as pipe elements. The element accounts for the thermal interactions between the fluid and the solid including the effects of convection and fluid mass transport.

Heat Transfer Analysis

After you create your model, HSTAR will help you model the heating and cooling effects including material phase changes caused by conduction, convection and radiation under steady state and transient design conditions.

HSTAR's new fast and robust sparse matrix solver improves analysis speeds by more than an order of magnitude without introducing any approximations in the result calculations. For very large models, the new iterative solver would be the recommended option.

In addition, improvements in the calculations of radiation view factors give the ability to analyze two-dimensional, axi-symmetric, and general three-dimensional open and closed systems, with or without the effect of surface blockers.

HSTAR can be used as a stand-alone system with GEOSTAR, COSMOS/M's fast and powerful pre- and postprocessor, or in combination with other COSMOS/M modules to give you an affordable solution.

With HSTAR, you'll be equipped to evaluate and troubleshoot the thermal performance of your designs quickly and accurately on your computer, saving you time and money.

SPECIFICATIONS

HSTAR

DESCRIPTION

HSTAR analyzes steady state & transient heat conduction, convection, and radiation problems (2D & 3D), calculates temperatures, temperature gradients and heat flow, and solves analogous field applications, such as flow through porous media.

USER INTERFACE

- Integrated with GEOSTAR for model creation and results display (pre- and postprocessing)
- Dynamic memory allocation
- Automatic node renumbering
- Access to COSMOS/M element and material libraries
- User definable material library

MODELING FEATURES

ELEMENT LIBRARY

- 2D quad and triangular isoparametric elements (plane stress, plane strain and body of revolution)
- 2D & 3D trusses
- 2D & 3D beams
- 3D shells (thin, thick & composite)
- 3D isoparametric solids
- Tetrahedral
- General mass
- Radiation link
- Convection link
- Hydraulic link
- Higher order elements

MATERIAL PROPERTIES

- Isotropic
- Orthotropic
- Composite
- Temperature dependent thermal conductivity, electrical conductivity, specific heat, and density

BOUNDARY CONDITIONS

- Time dependent nodal temperatures
- Temperature & time dependent heat flux, heat source/sink, convection, and radiation
- Apply boundary conditions to nodes and elements as well as geometric entities, points, curves, contours, surfaces, regions, and volumes

LOADS

- Heat flow
- Convection (film coefficient and ambient temperature)
- Radiation (temperature dependent emissivity, and ambient temperature)
- Temperature or time dependent internal heat generation
- Loads may also be applied to nodes, elements, or geometric entities

ANALYSIS FEATURES

- Gray and black body radiation
- Radiation view factors calculations
- Electro-thermal analysis
- Flow through pipe with heat transfer
- Material phase changes

RESULTS

- Direct use of HSTAR temperature results for linear and nonlinear thermal stress analysis in STAR and NSTAR
- Material phase change

OUTPUT VALUES

- Nodal temperatures
- Temperature gradients
- Heat flow

DISPLAYS

- Temperature, temperature gradient, resultant temperature gradient, heat flow, gradient heat flow, and resultant heat flow plots in the form of color-filled contours, colored line contours or vector plots
- X-Y plots of temperature or heat flow vs. time
- Tabular data reports

NUMERICAL TECHNIQUES

- Picard iterations
- Newton Raphson
- Line search option
- Backward-Euler method for unconditionally stable implicit transient problems
- Convergence based on nodal temperatures
- Direct Sparse Matrix solver
- Iterative solver

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
- Windows NT and EWS network option

COSMOS/M

STRUCTURAL RESEARCH & ANALYSIS CORP.
Developers of COSMOS/M Applications
12121 Wilshire Blvd.
7th Fl., Los Angeles, CA 90025
310 207-2800 Fax: 310 207-2774
www.cosmosm.com