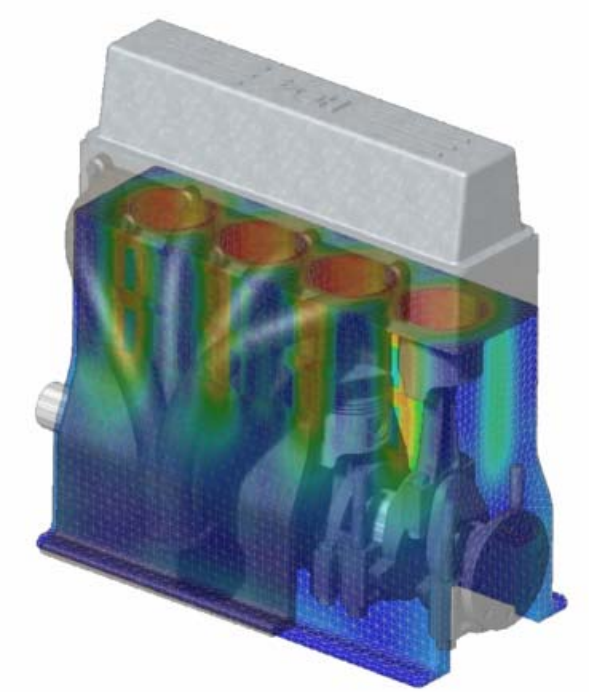
NEiNastran

Module NE-L5 (Nonlinear Transient Heat Transfer)

Overview

The Advanced Heat Transfer package adds nonlinear steady state and transient heat transfer to the impressive array of NASTRAN capabilities. Support is provided for both 2D and 3D models using solid, shell, and line element types. The heat transfer solver is fully integrated into NEiNastran allowing heat transfer models to also be used for structural analysis. Thermal loading from a heat transfer solution is generated automatically allowing thermal stress analysis to be performed directly following a heat transfer run (multi-physics capability).



Capabilities:

Solutions:

- Steady State Heat Transfer
  - Linear (Available with NE-L1)
  - Nonlinear
- Transient Heat Transfer
  - Linear
  - Nonlinear

Conduction:

- Temperature-dependent
  - Conductivity
  - Specific Heat
  - Internal heat generation
- Time-dependent internal heat generation
- Anisotropic thermal conductivity
- Contact element support (gap, slide line, surface to surface)

Free Convection:

- Temperature-dependent heat transfer coefficient
- Time-dependent heat transfer coefficient
- Spatial-dependent heat transfer coefficient
- Nonlinear functional forms

Radiation:

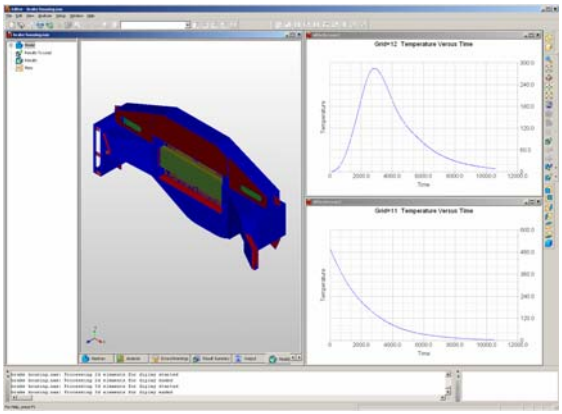
- Temperature-dependent
  - Emissivity
  - Absorptivity
  - Time-dependent exchange

Boundary Conditions:

- Specified constant temperatures for steady state analysis
- Specified time-dependent temperatures for transient analysis
- Initial starting temperatures for nonlinear steady state analysis
- Initial starting temperatures for all transient analysis

Initial Conditions:

- Starting temperatures for nonlinear steady sate analysis
- Automatic initial temperature correction
- Starting temperatures for all transient analysis



Output Features:

- Results measures include: heat fluxes, thermal gradients, temperatures, enthalpies, global conductivity matrixes, solution and mesh error estimates, element and grid point results
- Automatic and user definable measure sorting for handling multiple load case results
- Powerful grid and element set generator for generating sets that can be used to control output, define measure coordinate systems, generate grid point temperatures, and define measure sort commands
- Shell and solid element corner stress and strain output
- Element and grid point heat flux and thermal gradients can be output in any coordinate system including: material, grid point, basic, and global
- Automatic generation of structural temperatures for direct modeler import or structural analysis
- Heat flow into heat boundary elements

Global Matrix Output:

- Conductivity matrix
- Capacitance matrix

Direct Matrix Input Grid (DMIG) Support:

- Conductivity matrix import and export
- Capacitance matrix import and export
- Load vector import and export

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