

NEi Nastran

Module NE-L3 (Advanced Dynamics)

Overview

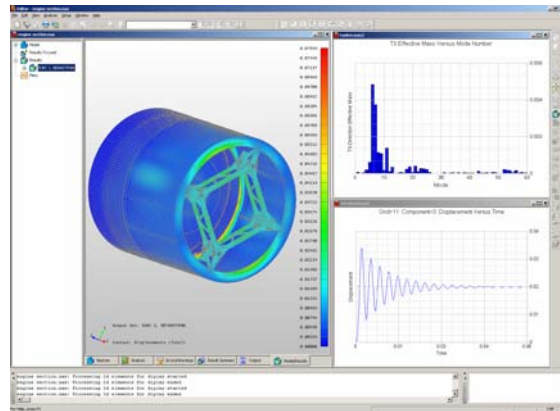
This package expands on the capabilities of the NE-L1 and NE-L2 packages with the addition of advanced dynamics solutions. Transient, frequency, response spectrum, random vibration, and complex eigenvalue extraction analysis are all added with this package. This package permits the application of all static loads as dynamic loads.

Capabilities:

Dynamic Response:

- Modal Transient Response
 - Modal variable output
- Modal Frequency Response
 - Real/imaginary and magnitude/phase output
- Modal Response/Shock Spectrum generation
- Modal Summation
 - NRL, SRSS, ABS, and CQC methods
- Direct Transient Response
 - Optional adaptive time-stepping
- Direct Frequency Response
- Random Response/Vibration
 - Power spectral density, auto correlation functions, and root mean square (RMS) stress, strain, and force, reaction, displacement, velocity, and acceleration output
- Vibration fatigue in random response solutions
 - Life, damage and biaxiality ratio output
 - Strain-life and stress-life
- Dynamic Design and Analysis Method (DDAM)
- Single and multi-phase DDAM operation capability
- Nonlinear Direct Transient Response (Requires NE-L4)
 - Optional adaptive time-stepping
- Response Spectra Generation for direct and modal transients
- Response Spectra Analysis Modal
- Complex Eigenvalue analysis

- Direct Enforced Motion
- Prestress Analysis options are available for each dynamic solution
 - Linear Prestress
 - Nonlinear Prestress (requires NE-L4)
- Automated Inertial Relief (AIR)



Damping Types:

- Variable modal damping
 - Equivalent viscous
 - Fraction of critical
 - Quality factor
- Structural damping
- Material damping
- Discrete viscous damping elements: CBUSH, CVISC, CDAMP
- Nonlinear and frequency dependent damping
- Raleigh and proportional damping
- Option to force modal damping to be treated as structural damping
- Nonlinear shock and vibration mount

Dynamic Loading Generality in the Time and Frequency Domains:

- All Static loads can be applied dynamically
- Enforced acceleration
- Time delays, time windows, and analytic and explicit time functions
- Nonlinear transient forces based on displacement and velocity

- Each load or enforced motion can have a different time history

Analysis and Data Recovery Methods:

- Modal and direct solutions
- Adaptive time stepping for direct transient
- Matrix method
- Displacement method

Global Matrix Output:

- Stiffness matrix
- Mass matrix
- Damping matrix

Direct Matrix Input Grid (DMIG) Support:

- Stiffness matrix import and export
- Mass matrix import and export
- Damping matrix import and export
- Load vector import and export

Model Reduction:

- Craig-Bampton Reduction (Component Modes Synthesis)
- Static condensation
- Guyan Reduction
- Export reduced mass, stiffness, damping, and load matrixes to DMIG or Nastran Output 2 (.OP2)
- Residual vectors for improved accuracy
- Automated model reduction tools

Modal Database:

- Allows reuse of Modal Data for further modal response analysis – Frequency response or transient response
- Allows multiple data recovery runs in modal response analysis for maximum results storage efficiency

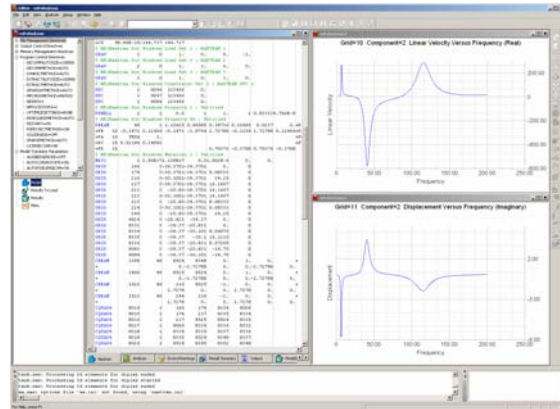
Modal Set:

- Selective mode usage for modal response analysis using
 - Set of mode numbers
 - Top effective mass count
 - Effective mass threshold

Modal Correlation:

- Modal Assurance Criterion (MAC) output and 3D plots
- Modal Cross-Orthogonality output and 3D plots
- MS Excel Comma Separated Variable (.CSV) and NEi Nastran Modal Database (.MDB) input formats

- Automatic interpolation of input data to closest grid



Efficient Solution of Large Models:

- Sparse direct and iterative matrix solvers to handle very large models with minimal processing time
- Parallel processing and I/O for faster performance
- Model reduction methods

Visualization in the Editor:

- View results real-time as they change for each frequency or time step
- Real/imaginary and magnitude/phase plots
- Generate x-y plots real-time and store as MS Excel Comma Separated Variable (.CSV) files
- Generate multiple plots with a single command
- View 3D MAC plots
- Custom x-y plotting of results

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For more information about our company or our products, please contact:

Headquarters:

NEi Software, Inc.

5555 Garden Grove Blvd., Suite 300
Westminster, CA 92683-1886
USA

Phone: +1.714.899.1220

Fax: +1.714.899.1369

Email: info@neisoftware.com

Website: www.NEiSoftware.com

Europe:

NEi Software EMEA Office

The Old Barrel Store
Draymans Lane, Marlow
Buckinghamshire, SL7 2FF
United Kingdom

Phone: +44.0.1628.400.645

Fax: +44.0.1628.891.701

E-mail: emea@neisoftware.com

Website: www.NEiSoftware.com/emea

Asia:

NEi Software Asia Office

Shinjuku Park Tower
N30th Floor 3-7-1 Nishi-Shinjuku
Shinjuku-ku, Tokyo, 163-1030
Japan

Phone: +81.03.5326.3062

Fax: +81.03.5326.3001

E-mail: asia@neisoftware.com



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