I-DEAS® Response Analysis

for analyzing nonlinear behavior

I-DEAS® Response Analysis provides you with the ability to interactively evaluate forced responses of a structure when a set of static, transient, frequency (harmonic), random (PSD), or response (shock) spectrum excitations are applied. The dynamic and static modes, which are used to represent the linear model of the structure, can be generated by I-DEAS or other FE solvers, or created from test measurements. These modes are then used to evaluate responses in I-DEAS Response Analysis using modal approach.

I-DEAS Response Analysis provides you with the tools to import, generate, and edit the loading (excitation) information from test or analysis. The excitations can be force, enforced motion, or distributed loads (e.g., dynamic pressure). The user can then apply excitations to the structure, and control dynamic modes, static corrections, and damping assumptions to define an event for response analysis. Motion, force, and stress responses can be evaluated. Extensive XY graphics and contour display capabilities allow results to be reviewed and compared with other data or allowables.

Five different response analyses are provided by I-DEAS Response Analysis product:

Static Response Analysis
Static response analysis computes the static response of a structure to a set of simultaneous time-varying static excitations using linear superposition method.

Transient Response Analysis
Transient response analysis computes the dynamic response of a structure to a set of simultaneous transient excitations using either mode-acceleration or mode-displacement methods.

Frequency Response Analysis
Frequency response analysis computes the steady-state response of a structure to a set of simultaneous oscillatory excitations defined by spectrum functions.

Random Response Analysis
Random response analysis computes the PSD (Power Spectral Density) and RMS (Root Mean Square) of response of a structure to a set of simultaneous random excitations defined by PSD and CSD (Cross Spectral Density) functions.

Response Spectrum Analysis
Response spectrum analysis computes the peak response of a structure to a set of simultaneous base excitations defined by response spectum functions

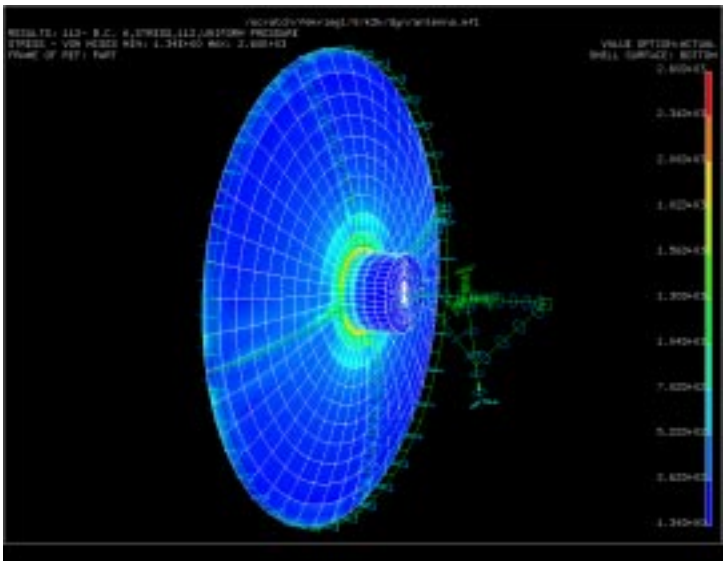
Model Definition

The model for response analysis can be prepared by a test or an FE analysis software:
• FE Model contains nodes, elements, and a set of static and/or dynamic modes. You can use I-DEAS Model Solution™, I-DEAS Variational Analysis, or external solvers (e.g., Nastran, Abaqus, or Ansys) to generate modal representation for response analysis.
• Test Model contains nodes, trace lines, and a set of dynamic modes. You can use MTS Test products to generate test modes for response analysis.

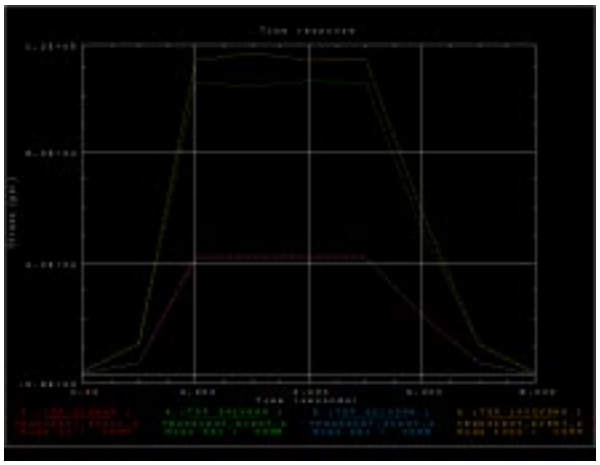
Excitations

The following excitations can be used for response analysis:

• Distributed loads: for static, transient, frequency, and random response analysis.
• Nodal forces: for transient, frequency, and random response analysis.
• Enforced motion (displacement, velocity, or acceleration): for transient, frequency, random, and response spectrum analysis.
• Impact: for transient response analysis.
• Rotating forces and mass unbalances: for frequency response analysis.



RMS VonMises stress from a PSD pressure loading.



Nodal Von Mises stress response function plot.

Capability Summary

• Response functions can be generated at nodes or on elements for static, transient, frequency, and random analysis. Response Analysis can compute, display, and report the following response functions: displacement, velocity, acceleration, reaction force, element force, stress, strain, and shell stress resultants.
• Response results datasets can be generated for the whole structure or selected groups of node and elements at given points in time (for static and transient analysis) or in frequency (for frequency analysis). Response Analysis can compute, display, and report the following response results sets: displacement, velocity, acceleration, stress, strain, element forces, shell stress resultants, and strain energy.

• RMS and level-crossing results can be generated for the whole structure or selected groups of nodes and elements for random response analysis. Response Analysis can compute, display, and report the RMS and level-crossing results sets for the data components of the following: displacement, acceleration, stress, element force, and shell stress resultants. For dynamic stress analysis, the software can also calculate the RMS and level-crossing rate of the vonMises stresses.
• Peak response results can be generated for the whole structure or selected groups of nodes and elements for response spectrum analysis. Response Analysis can compute, display, and report the peak values results for the data components of the following: displacement, acceleration, stress, element force, and shell stress resultants. For dynamic stress analysis, the software can also calculate the peak vonMises stresses.

Data Processing Tools

• Import/export data from/to universal files (I-DEAS), time history files (MTS), RPC III files (MTS), DAC files (nCode), and spreadsheet text files.
• Mathematical and statistical processing editing and managing functions.
• XY graphics for display and probing convert of PSD functions to time functions.

Prerequisites

Core Simulation

For More Information

For more information, contact your local SDRC representative or call 1-800-848-7372.