Finite Element Vibration Analysis with WaveSim

The optimal addition for WaveCam

BENEFITS

- Comparison between modal results of simulation and results of WaveCam frequency operating deflection shapes (ODS) or modal results from other vibration sensors
- Semi-automatic geometry matching between the camera image and the solid model of the simulation and subsequent MAC (Modal Assurance Criterion) – calculation of the deflection shapes
- Automatic mesh generation from STL and OBJ files
- Parameter library for most common materials
- Selectable boundary conditions and loads (free, fixed, force, pressure, etc.)
- Various function types (constant, chirp, pulse, harmonic, etc.)

APPLICATIONS

- Research & development
- Prototyping
- Validation of WaveCam measurements
- Preparation of WaveCam measurements
- Simulation of new designs and external loads
- Static, modal and transient analysis

Finite Element Analysis (FEA) is a powerful tool to predict the dynamic vibration behaviour of any kind of structure numerically. Based on the structural geometry, the specification of material properties and the imposed boundary conditions, the modal parameters (natural frequency, mode shape and damping) of the structure can be calculated. This method thus forms an important instrument in component and structure development (e.g., digital prototyping), which is mainly reflected in a shortened product development time.

The FEA module provides different algorithms to identify modal parameters (FEA Modal), simulate the structures static stress and strain (FEA Static), calculate the structures dynamic answer to different external loads (FEA Transient) and calculate frequency response functions (FEA Frequency Response). Additionally, the simulation model can be enhanced with real world measurements based on WaveCam measurements using the FE Model Updating functionality.

This helps with planning, construction and maintenance. New designs, changes to the structure and external loads can be precisely simulated and optimized. This powerful tool assists you in your development process and prototyping to identify operation-critical or troublesome resonant frequencies of the structure and to gain a clear understanding of the cause-and-effect relationships between specific vibration excitations and their response.

For the first time, compare structural dynamic high-speed camera analyses with simulations and classical vibration sensors, such as accelerometers or laser vibrometers, and validate your measurements or simulations. By means of semi-automatic geometry matching, similarities between the results can be determined by determining the MAC criterion. By supporting the UFF file format, any modal result from different modal analysis software packages can be used.

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SPECIFICATIONS FOR SOFTWARE:

Simulation needs only .stl or .obj files from a 3D model.

FEA

Module for finite element analysis

Features:

- Modal analysis
- Transient dynamic analysis
- Frequency response dynamic analysis
- Static analysis

FEA Model Updating

Module for adapting your finite element simulation to measured modal results.

Features:

- Geometry matching
- Optimization of the simulation mode

Result Viewer

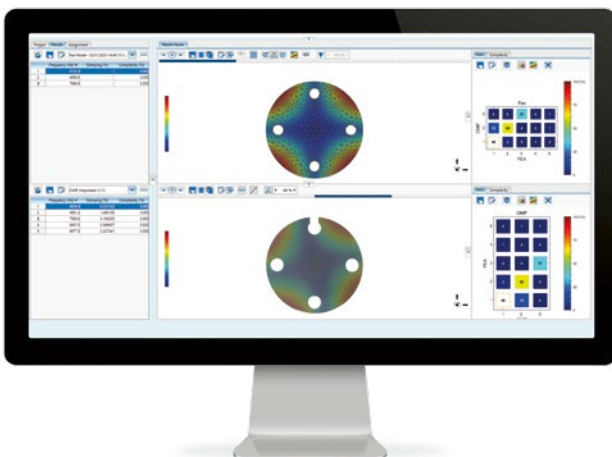Module for finite element analysis

Features:

- Comparison between modal results of simulation and results of WaveCam frequency operating deflection shapes (ODS) or modal results from other vibration sensors
- Semi-automatic geometry matching between the camera image and the solid model of the simulation and subsequent MAC (Modal Assurance Criterion) – calculation of the deflection shapes
- Direct comparison of two modal results: eigenfrequency, damping, complexity, mode shapes (MAC)
- Side by side animation of mode or deflection shapes
- Access to currently calculated as well as imported with universal file format

Report

Module for automatically generating report documents

Features:

- Integration of all relevant information (results, images, videos etc.)
- Supported export types
  - DOCX (Microsoft® Word)
  - PPTX (Microsoft PowerPoint®)
  - PDF (Portable Document Format)

Software WaveSim – Comparison between FEA Modal and WaveCam results

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