Experimental Modal Analysis (EMA)
with ARTeMIS Modal

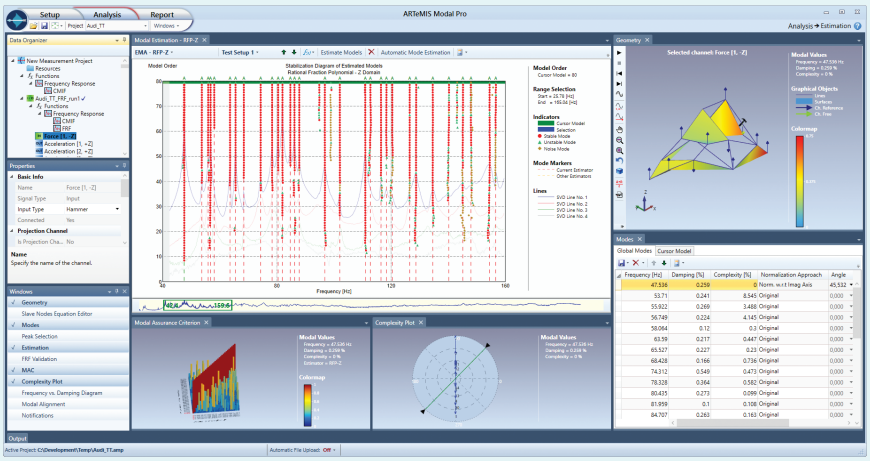
All versions of ARTeMIS Modal support the Experimental Modal Analysis (EMA) plugin that enables frequency domain estimation of modal parameters from Frequency Response Functions (FRF's). FRF's can be uploaded using Universal File Format (UFF/UNV), or be estimated in ARTeMIS Modal by uploading input and output time domain measurements in the Manage Measurement Task, or by using the Impact Testing Module.

Two polyreference MIMO methods are available; CMIF Peak Picking and RFP-Z polynomial estimation.

Structural
Vibration
Solutions

TECHNICAL
DETAILS

ARTeMIS
Modal



Impact testing of an Audi TT car body

Impact testing of an Audi TT car body, supported in a free-free boundary conditions on four air cushions. Four references impact points were excited with 14 accelerometers as responses. The modal parameters of the car body have been computed with the RFP-Z method. This MIMO technique is one of the estimators available in the EMA Plugin.

BENEFITS OF THE SUPPORTED ALGORITHMS

Complex Mode Indicator Function (CMIF):

· Intuitive modal parameter estimation based on peak-picking in frequency domain.

· Immediate results even in case of large number of measurement points and modes.

· Extremely robust being based on the Singular Value Decomposition of the matrices of the Frequency Response Functions.

Rational Fraction Polynomial in Z domain (RFP-Z):

· Estimates global modes from the stabilization diagram of modes extracted from rational polynomials.

· Estimates natural frequencies, damping ratios and mode shapes using Automatic Mode Estimation procedure.

· Modal Alignment diagram shows the natural frequencies, damping ratios and mode shape complexity for all similar modes in the stabilization diagram.

· Cursors used to select the frequency range to use in the polynomial estimation.

· Correction of damping estimates is available in case the exponential windows are used during the impact testing using the Impact Testing Module.

· Synthesized FRF's based on a selected range of global modes can be validated against measured FRF's.

Modal Validation:

· Both EMA methods are supported by the validation features available in the ARTeMIS Modal.

· Available validation features are: Modal Assurance Criterion (MAC), Complexity Plot with possible normal mode estimation, Mode Shape Animation, and Frequency versus Damping diagrams.

· For ARTeMIS Modal Standard and Pro versions there is an additional Validation Task with more validation features such as: Overlaid Mode Shape Animation, Mode Shape Difference Animation, Cross Modal Assurance Criterion, and validation against other estimators or projects.

Impact Testing Module:

· If the EMA plugin is available along with a data acquisition plugin, then Impact Testing can be performed directly using any version of ARTeMIS Modal.

· The impact testing is made in a geometry driven way, starting by creating a geometry, followed by defining an impact sequence and finally configuring the available hardware including the impact hammer trigger level and possible force and response windows.

· Measurement sequence is interactive and the software is guiding the user through the process with an on screen and sound notifications. Double hit detection is available by default and invalid impacts are automatically discarded.

· Impacts can be validated in terms of raw time measurements, spectra's, H1, H2, Hv FRF estimators and coherence.

ARTeMIS Modal – EMA

More information about ARTeMIS Modal/EMA is available on our website:
www.svibs.com/EMA

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