CRYSTAL INSTRUMENTS

EDM Modal Software

Modal Testing & Analysis Software by Crystal Instruments

Import FRF *(No hardware required)*	
EMA-01	Geometry is always required for mode shape animation.
EMA-11	(Standard Modal Analysis). Always required for post-processing and getting results.
Hammer Impact Testing	
EMA-01	(Geometry) is always required.
EMA-02	(Hammer Impact Module) is required.
EMA-11	(Standard Modal Analysis). Basic requirement. Includes the LSCE method (Least Squares Complex Exponential) and **CANNOT** be used for Multiple References (MIMO).
Hardware Required	Depends on type of excitation/test. For example: CoCo-80X, CoCo-70X, Spider-20, Spider-80X.
EMA-15 & EMA-16 can be used as an option (Described in further detail in this document.)	
Hammer Impact Testing with Roving Excitation	
Hammer is roving and sensor is fixed (reference).	
EMA-11	For tests with only 1 sensor
EMA-15	For tests using more than one sensor, which results in multiple references.
EMA-15	For tests using one or more triaxial sensors, there are multiple directions (x,y,z) even though the sensor is fixed, there are multiple references.
Hammer Impact Testing with Roving Response	
Hammer is fixed (single reference).	EMA-15 is NOT required, EMA-11 is sufficient.
EMA-11 - Standard Modal Analysis	
Time domain based curve fitting method.	
Basic option always required to process the measurements and obtain results.	
The way to process the measurements is by Curve-fit data to obtain mode shapes, frequencies and damping.	
Only includes the **LSCE method** (Least Squares Complex Exponential) and **CANNOT** be used for Multiple References (MIMO).	
EMA-15 - (Poly-Reference Curve Fitter)	
Requires EMA-11.	
When there are multiple references (which is common with MIMO test-shaker excitation), then EMA-15 is required, in addition to EMA-11.	
Has PTD (Poly-Reference Time Domain) which is a MUST for multiple references (MIMO)	
Software Poly-Reference (EMA-15) it is always required for: • MIMO test (multiple shaker) • Hammer Impact testing if triaxial sensor is used. • Hammer Impact testing if roving excitation test is carried with MULTIPLE SENSORS.	

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EMA-16 - (Poly-X Curve Fitter)

Requires EMA-11.

EMA-11 and EMA-15 have only **time domain based curve fitters** (LSCE and PTD respectively.)

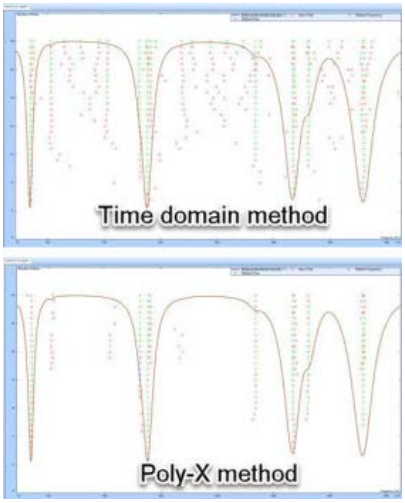
For **frequency domain based curve fitting method,** EMA-16 is required in addition to EMA-11.

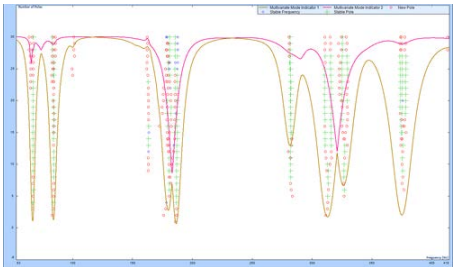
Frequency domain based curve fitting method, **Poly-X method, is called p-LSCF method.**

Software Poly-X (EMA-16) it is always suggested and recommended (not required), because it is more clean and efficient.

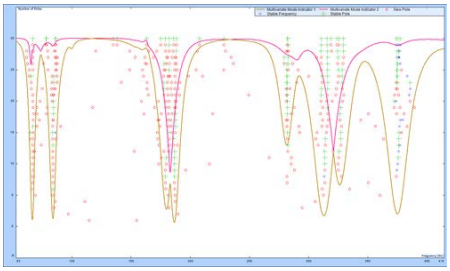
Additional information and features:

1. Our EMA software for Modal Analysis is preferable because it is “easy-to-use”, “simple” etc.
2. We also have a few features that most of our competitors don’t have:
   - Poly-X (only Siemens LMS and Crystal Instruments have it)
     https://www.crystalinstruments.com/polyx-the-polyreference-lscf-implementation-and-experiment



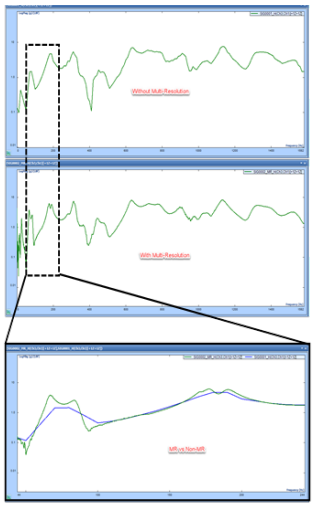


Stability diagram using PTD estimator

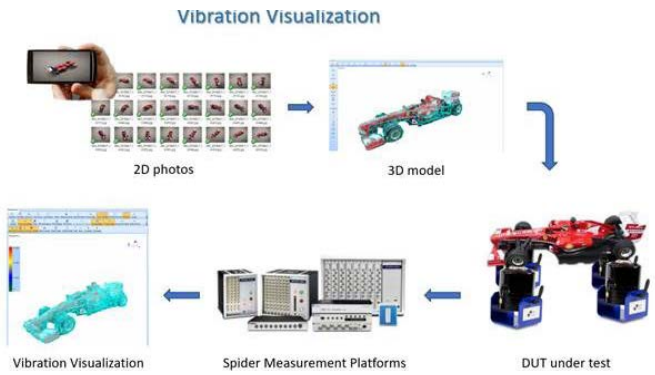


Stability diagram using PolyX estimator

- **Multi-Resolution Spectrum Analysis** (Only Crystal Instruments has this option).
  https://www.crystalinstruments.com/blog/2019/11/20/multi-resolution-spectrum-analysis-in-modal-testing



- **Vibration Visualization** (Only Crystal Instruments has this option).
  https://www.crystalinstruments.com/s/Vibration-Visualization.pdf



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