EMA Synthesis

The Synthesis tab checks how well your modal results describe the measur modes in a saved shape to rebuild (synthesize) each FRF, then draws the measured FRF. If the modes were picked well, the two curves lie c band that was curve-fitted.

Settings: the shape to use, the list of its modes, the residual options, a and Error).

Signal table: the measured FRFs that were used to calculate the shape.

Chart: the measured FRF and the synthesized FRF for the signal selecte pane shows the magnitude and the lower pane shows the phase.

NOTE: Before you can use this tab, you must calculate and save at least Diagram tab. The measured signals that were used to calculate the shap available. Shapes that were imported from a file (for example, a UFF fi

NOTE: You cannot use this tab while a test is running.

Choosing a Shape

Shape: Select the shape that you want to check. The list shows all the test. When you change the shape, EDM loads its measured FRFs and c

When you open the Synthesis tab, EDM selects the animated shape that is activ

Refresh Updates the list of shapes, reloads the measured FRFs, and ca
Use this if you have calculated a new shape or changed a shape since

Modes

The Modes list shows each mode in the shape, for example Mode 1: 125.431 Hz , 1.254 %
(frequency and damping).

Display poles When this is selected, a vertical cursor is drawn on the cha
mode that is checked in the Modes list. Click a mode in the list to check or clear
see whether each mode lines up with a peak in the measured FRF.

NOTE: The Modes list only controls which cursors are shown. The synthesis
modes in the shape that are inside the curve-fitted frequency band. Cl
it from the synthesis.

Residuals

The synthesis uses only the modes inside the curve-fitted band. Modes
the FRF inside the band. Residual terms account for these out-of-band

Lower residual Adds a term for the effect of modes below the band. This mostly improves
the low-frequency end of the band.

Upper residual Adds a term for the effect of modes above the band. This mostly improves
the high-frequency end of the band.

Both are selected by default. When you change either option, EDM cal

Fix Me! Screenshot: The same FRF shown twice, once with the residuals s
them cleared, to show how the residuals improve the fit near the ends

TIP: If the synthesized curve fits well near the modes but is offset from
ends of the band, make sure both residuals are selected.

Signal Table

The signal table lists the measured FRFs used by the shape, with each
Total count shows the number of signals.

Click a signal in the table to show it on the chart:

- The measured FRF is drawn in green.
- The synthesized FRF is drawn in purple. Synthesized

Only the frequency band that was curve-fitted in the Stability Diagram
combines modes from several bands, each band is shown.

Stepping through signals:

Previous signal / Next signal - Shows the previous or next signal in the table. A table, it goes back to the start.

Run - Steps through the signals automatically. The button turns into Stop while it runs. Click to stop.

Speed (Seconds) - Sets how long each signal is shown, from 1 to 10 seconds. Run uses this while stepping. The default is 2 seconds.

These controls are not available when the table has only one signal.

Fix Me! Screenshot: Close-up of the signal table and the Previous signal, Run, and Speed controls.

Correlation and Error

When you select a signal, EDM compares the synthesized FRF with the measured FRF in the fitted band and shows two values:

Correlation - How similar the shapes of the two curves are, from 0% to 100%. 100% means the synthesized FRF has exactly the same shape as the measured FRF. A high value means the chosen modes describe this signal well.

Error - The size of the difference between the two curves, compared with the measured FRF. 0% means the curves are the same. Lower is better.

Fix Me! Screenshot: Close-up of the Correlation and Error values for a well-fitted signal.

What to look for:

- High Correlation and low Error for most signals means that the modes and the fitted band were chosen well.
- A low Correlation for only a few signals may point to a bad measurement or a problem with those signals. Check them in Modal Data Selection.
- A low Correlation for most signals may mean that a mode was missed or that the wrong modes were selected. Look for peaks in the measured FRF that are not marked (this appears as a yellow cursor with no mode selected), and go back to the Stability Diagram.

NOTE: Error is calculated relative to the synthesized FRF, so it can be greatly inflated when the synthesized FRF is much smaller than the measured FRF. If the value is very large, it may show as NaN.

NOTE: The Correlation and Error values are updated only when you select a signal. If you change the shape, select a signal again to update them.

Right-Click Menu

Right-click on the chart to open the menu.

Fix Me! Screenshot The right-click menu open on the Synthesis chart, wit submenu sh ving.

Zoom Back – Returns to the previous zoom level.

Un-zoom-All – Returns to the full view of the chart.

Remove Cursor – Removes one mode cursor from the chart.

Remove All Cursors – Removes all the mode cursors from the chart.

Horizontal Axis – Shows the frequency axis on a Linear or Log scale.

Vertical Axis – Changes how the FRFs are displayed:

- Magnitude, dB + Phase
- Log Magnitude + Phase
- Magnitude + Phase
- Real + Imaginary

Edit Legend – Changes the names and colors of the curves in the legend.

Export Signal – Saves the measured FRF and the synthesized FRF of the si a Universal File Format (.uff). (Only the curve-fitted band is exported. Select before you use this option.

FAQs

Why is the signal table EDM? – EDM could not find the measured signals that w calculate the shape. They may have been moved, renamed, or deleted. also have no measured signals to compare with.

Why does clearing a mode not change the synthesized FRF? – The mode list controls t cursors on the chart. All the modes in the shape are always used in th

Why does the Shape go back to a different shape when I return to the Synthesis tab, EDM selects the shape in the active animation tab. To keep a diffe shape every time, make it the active shape in the Animation tab.

What is a good Correlation value? – There is no fixed limit, but a well-fitted signa Correlation above 90%. Compare signals with each other: the ones wit attention.

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Last update: 2026/10/15 19:12