Animation of Experimentally Derived Structural Resonances
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One of the significant features of ME'scope version 5.0 is its ability to animate experimentally derived structural resonances, also called mode shapes. To acquire the data necessary to determine these modes, a modal test must be done on the structure.

The vibration response of the model airplane was measured at 67 different test points across the wings, tail, and fuselage using a tri-axial accelerometer, 2 lb. electro-dynamic shaker, force sensor, dynamic signal analyzer, and of course, ME'scope. The airplane was excited using the electro-dynamic shaker attached to its left wing. The shaker was driven with a broadband random signal which simultaneously excited many of the structural resonances, which were in turn measured by the accelerometer at each of the test points.

Here, you can see a video of the modal test itself, including the fore-mentioned equipment setup and data acquisition window within ME'scope.

To truly bring the animation of the structural resonances to life, a 3D photorealistic model of the airplane was made using Eos System's Photomodeler software. The photo model was created from 8 digital photos of the plane. The 3D model was created from the photos using points, lines, curves, and surfaces. The final model contained over 5,300 points and 300 surfaces.

After importing the photo model of the airplane into ME'scope and combining it with the data from the modal test, we are now ready to animate the experimentally derived mode shapes.

The Peak Cursor function of ME'scope allows the user to focus on a small frequency band of measurement data and display a mode shape from that band. The photo model is then animated based on the selected mode shape. The Peak Cursor can be widened or narrowed to include or exclude test data, and can also be moved interactively to display different mode shapes directly from the experimental data.

All experimentally derived mode shapes can be displayed in ME'scope using slow motion sinusoidal animation. Each mode shape is identified by its resonance frequency in hertz.

While animating the structure, ME'scope offers the user the ability to:
- Rotate the structure
- Make the structure surface transparent
- Turn on and off the display of points and lines
- Utilize the Quad View for better visualization of mode shapes
- Color different portions of the structure model
- And much more

By viewing mode shapes in animation, an engineer can gain a better understanding of the resonant behavior of a structure.