

Detected Resonant Frequencies (0-200 Hz):

80

124

146

186

Estimated Damping Ratios:

Mode near 80.00 Hz  $\rightarrow \zeta = 0.0375$

Mode near 124.00 Hz  $\rightarrow \zeta = 0.0484$

Mode near 146.00 Hz  $\rightarrow \zeta = 0.0274$

Mode near 186.00 Hz  $\rightarrow \zeta = 0.0430$

Normalized Mode Shapes (0-200 Hz):

Mode at 80.00 Hz:

X:  $0.054\angle 16.2^\circ$

Y:  $0.102\angle 64.6^\circ$

Z:  $1.000\angle -106.9^\circ$

Mode at 124.00 Hz:

X:  $0.031\angle 32.0^\circ$

Y:  $0.332\angle 41.5^\circ$

Z:  $1.000\angle -133.3^\circ$

Mode at 146.00 Hz:

X:  $0.147\angle 78.2^\circ$

Y:  $1.000\angle -77.5^\circ$

Z:  $0.322\angle -168.4^\circ$

Mode at 186.00 Hz:

X:  $0.297\angle -123.7^\circ$

Y:  $0.682\angle 77.3^\circ$

Z:  $1.000\angle 143.3^\circ$

==== Modal Parameter Summary (0-200 Hz) ===

Freq_Hz	Damping	Phi_X	Phi_Y	Phi_Z
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80	0.0375	$0.052312+0.015176i$	$0.04384+0.092235i$	$-0.29028-0.95694i$
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124	0.048387	0.02631+0.016424i	0.24906+0.22005i	-0.68624-0.72737i
146	0.027397	0.030205+0.14405i	0.2161-0.97637i	-0.31499-0.064759i
186	0.043011	-0.16505-0.24742i	0.14975+0.66553i	-0.80133+0.59822i

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Estimated Damping Ratios:

0.0375  
0.0484  
0.0274  
0.0430

==== Modal Summary (0-200 Hz) ===

Mode 1: f=80.00 Hz, Damping=0.0375, k\_dyn\_X=129945915.77 N/m, k\_dyn\_Y=69307613.52 N/m, k\_dyn\_Z=7077965.56 N/m

Mode Shape (X,Y,Z):  $0.054\angle 16.2^\circ, 0.102\angle 64.6^\circ, 1.000\angle -106.9^\circ$

Mode 2: f=124.00 Hz, Damping=0.0484, k\_dyn\_X=266055536.25 N/m, k\_dyn\_Y=24828917.98 N/m, k\_dyn\_Z=8251866.38 N/m

Mode Shape (X,Y,Z):  $0.031\angle 32.0^\circ, 0.332\angle 41.5^\circ, 1.000\angle -133.3^\circ$

Mode 3: f=146.00 Hz, Damping=0.0274, k\_dyn\_X=98546630.80 N/m, k\_dyn\_Y=14504707.36 N/m, k\_dyn\_Z=45105063.76 N/m

Mode Shape (X,Y,Z):  $0.147\angle 78.2^\circ, 1.000\angle -77.5^\circ, 0.322\angle -168.4^\circ$

Mode 4: f=186.00 Hz, Damping=0.0430, k\_dyn\_X=253150497.66 N/m, k\_dyn\_Y=110372625.11 N/m, k\_dyn\_Z=75292444.87 N/m

Mode Shape (X,Y,Z):  $0.297\angle -123.7^\circ, 0.682\angle 77.3^\circ, 1.000\angle 143.3^\circ$