

Detected Resonant Frequencies (0-200 Hz):

14  
124  
148  
188

Estimated Damping Ratios:

Mode near 14.00 Hz →  $\zeta = 0.2857$   
Mode near 124.00 Hz →  $\zeta = 0.0323$   
Mode near 148.00 Hz →  $\zeta = 0.0135$

Normalized Mode Shapes (0-200 Hz):

Mode at 14.00 Hz:

X:  $0.067 \angle 167.1^\circ$   
Y:  $0.200 \angle 152.1^\circ$   
Z:  $1.000 \angle 160.2^\circ$

Mode at 124.00 Hz:

X:  $0.300 \angle 44.4^\circ$   
Y:  $0.051 \angle -14.8^\circ$   
Z:  $1.000 \angle 53.2^\circ$

Mode at 148.00 Hz:

X:  $0.337 \angle -15.1^\circ$   
Y:  $0.830 \angle -80.4^\circ$   
Z:  $1.000 \angle 24.8^\circ$

Mode at 188.00 Hz:

X:  $0.398 \angle -22.0^\circ$   
Y:  $0.656 \angle 90.4^\circ$   
Z:  $1.000 \angle 10.7^\circ$

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

Freq_Hz	Damping	Phi_X	Phi_Y	Phi_Z
14	0.28571	-0.065216+0.014991i	-0.17672+0.093585i	-0.94084+0.33886i

124	0.032258	0.21444+0.21003i	0.049244-0.012997i	0.59907+0.8007i
148	0.013514	0.32544-0.088063i	0.13866-0.8187i	0.90777+0.41946i
188	NaN	0.36857-0.14918i	-0.0051381+0.65564i	0.98262+0.18561i

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14  
124  
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Estimated Damping Ratios:

0.2857  
0.0323  
0.0135  
NaN

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

Mode 1: f=14.00 Hz, Damping=0.2857, k\_dyn\_X=17406072.62 N/m, k\_dyn\_Y=5824650.74 N/m, k\_dyn\_Z=1164756.02 N/m

Mode Shape (X,Y,Z): 0.067∠167.1°, 0.200∠152.1°, 1.000∠160.2°

Mode 2: f=124.00 Hz, Damping=0.0323, k\_dyn\_X=30954753.95 N/m, k\_dyn\_Y=182435830.53 N/m, k\_dyn\_Z=9291484.64 N/m

Mode Shape (X,Y,Z): 0.300∠44.4°, 0.051∠-14.8°, 1.000∠53.2°

Mode 3: f=148.00 Hz, Damping=0.0135, k\_dyn\_X=152434364.77 N/m, k\_dyn\_Y=61891315.53 N/m, k\_dyn\_Z=51391810.20 N/m

Mode Shape (X,Y,Z): 0.337∠-15.1°, 0.830∠-80.4°, 1.000∠24.8°

Mode 4: f=188.00 Hz, Damping=NaN, k\_dyn\_X=251960591.41 N/m, k\_dyn\_Y=152797534.97 N/m, k\_dyn\_Z=100183182.95 N/m

Mode Shape (X,Y,Z): 0.398∠-22.0°, 0.656∠90.4°, 1.000∠10.7°