Detected Resonant Frequencies (0-200 Hz):

16
52
88
118
122
148
186

Estimated Damping Ratios:

Mode near 16.00 Hz → ζ = 0.1250
Mode near 52.00 Hz → ζ = 0.0577
Mode near 88.00 Hz → ζ = 0.0341
Mode near 118.00 Hz → ζ = 0.0254
Mode near 122.00 Hz → ζ = 0.0738
Mode near 148.00 Hz → ζ = 0.0203

Normalized Mode Shapes (0-200 Hz):

Mode at 16.00 Hz:
X: 0.042∠170.7°
Y: 0.061∠53.6°
Z: 1.000∠171.9°

Mode at 52.00 Hz:
X: 0.053∠50.8°
Y: 0.091∠-103.5°
Z: 1.000∠-96.7°

Mode at 88.00 Hz:
X: 0.052∠137.7°
Y: 1.000∠-44.6°
Z: 0.361∠6.2°

Mode at 118.00 Hz:
X: 0.112∠119.2°
Y: 0.088∠109.3°
Z: 1.000∠115.8°

Mode at 122.00 Hz:
X: 0.107∠92.0°
Y: 0.042∠79.7°
Z: 1.000∠89.6°

Mode at 148.00 Hz:
X: 0.089∠22.9°
Y: 0.429∠-89.8°
Z: 1.000∠23.3°

Mode at 186.00 Hz:
X: 0.075∠-44.3°
Y: 0.539∠160.8°
Z: 1.000∠9.2°
=== Modal Parameter Summary (0-200 Hz) ===

Freq_Hz	Damping	Phi_X	Phi_Y	Phi_Z
16	0.125	-0.041817+0.0068804i	0.036375+0.04926i	-0.98997+0.14129i
52	0.057692	0.033721+0.041373i	-0.021312-0.088665i	-0.11721-0.99311i
88	0.034091	-0.038594+0.035106i	0.71227-0.7019i	0.3593+0.039071i
118	0.025424	-0.054688+0.09779i	-0.028963+0.082748i	-0.43594+0.89998i
122	0.07377	-0.0037256+0.10714i	0.0074374+0.040952i	0.0065517+0.99998i
148	0.02027	0.082297+0.03482i	0.0018375-0.42859i	0.91862+0.39514i
186	NaN	0.053762-0.05254i	-0.50941+0.17704i	0.98722+0.15936i

Detected Resonant Frequencies (0-200 Hz):
16
52
88
118
122
148
186

Estimated Damping Ratios:
0.1250
0.0577

0.0341
0.0254
0.0738
0.0203
NaN

=== Modal Summary (0-200 Hz) ===
Mode 1: f=16.00 Hz, Damping=0.1250, k_dyn_X=4475337.17 N/m, k_dyn_Y=3097284.74 N/m, k_dyn_Z=189661.82 N/m
Mode Shape (X,Y,Z): 0.042∠170.7°, 0.061∠53.6°, 1.000∠171.9°
Mode 2: f=52.00 Hz, Damping=0.0577, k_dyn_X=153098834.03 N/m, k_dyn_Y=89609953.78 N/m, k_dyn_Z=8171574.94 N/m
Mode Shape (X,Y,Z): 0.053∠50.8°, 0.091∠-103.5°, 1.000∠-96.7°
Mode 3: f=88.00 Hz, Damping=0.0341, k_dyn_X=951841187.41 N/m, k_dyn_Y=49659643.27 N/m, k_dyn_Z=137401327.58 N/m
Mode Shape (X,Y,Z): 0.052∠137.7°, 1.000∠-44.6°, 0.361∠6.2°
Mode 4: f=118.00 Hz, Damping=0.0254, k_dyn_X=79261080.92 N/m, k_dyn_Y=101295975.66 N/m, k_dyn_Z=8880618.56 N/m
Mode Shape (X,Y,Z): 0.112∠119.2°, 0.088∠109.3°, 1.000∠115.8°
Mode 5: f=122.00 Hz, Damping=0.0738, k_dyn_X=55612994.13 N/m, k_dyn_Y=143243305.98 N/m, k_dyn_Z=5962106.66 N/m
Mode Shape (X,Y,Z): 0.107∠92.0°, 0.042∠79.7°, 1.000∠89.6°
Mode 6: f=148.00 Hz, Damping=0.0203, k_dyn_X=399519728.92 N/m, k_dyn_Y=83298685.81 N/m, k_dyn_Z=35701266.42 N/m
Mode Shape (X,Y,Z): 0.089∠22.9°, 0.429∠-89.8°, 1.000∠23.3°
Mode 7: f=186.00 Hz, Damping=NaN, k_dyn_X=1399567322.38 N/m, k_dyn_Y=195084220.29 N/m, k_dyn_Z=105207701.17 N/m
Mode Shape (X,Y,Z): 0.075∠-44.3°, 0.539∠160.8°, 1.000∠9.2°