Detected Resonant Frequencies (0-200 Hz):

16
68
88
128
150

Estimated Damping Ratios:

Mode near 16.00 Hz → ζ = 0.1250
Mode near 68.00 Hz → ζ = 0.1324
Mode near 88.00 Hz → ζ = 0.0341
Mode near 128.00 Hz → ζ = 0.0312
Mode near 150.00 Hz → ζ = 0.0267

Normalized Mode Shapes (0-200 Hz):

Mode at 16.00 Hz:
X: 0.048∠170.7°
Y: 0.115∠12.9°
Z: 1.000∠167.7°

Mode at 68.00 Hz:
X: 0.191∠7.0°
Y: 0.331∠-94.1°
Z: 1.000∠-3.0°

Mode at 88.00 Hz:
X: 0.106∠156.8°
Y: 1.000∠-35.5°
Z: 0.230∠-1.4°

Mode at 128.00 Hz:
X: 0.045∠23.6°
Y: 0.035∠-149.8°
Z: 1.000∠22.2°

Mode at 150.00 Hz:
X: 0.045∠-1.6°
Y: 0.244∠-127.0°

Z: 1.000∠16.1°

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

Freq_Hz	Damping	Phi_X	Phi_Y	Phi_Z
16	0.125	-0.046907+0.0076444i	0.11166+0.025655i	-0.9771+0.21279i
68	0.13235	0.18981+0.023414i	-0.023468-0.32978i	0.9986-0.052983i
88	0.034091	-0.097787+0.041974i	0.81446-0.58022i	0.22952-0.0056447i
128	0.03125	0.041447+0.018065i	-0.03065-0.017866i	0.92564+0.3784i
150	0.026667	0.044729-0.0012775i	-0.14661-0.19473i	0.96084+0.2771i

Detected Resonant Frequencies (0-200 Hz):

16
68
88
128
150

Estimated Damping Ratios:

0.1250
0.1324
0.0341
0.0312
0.0267

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

Mode 1: f=16.00 Hz, Damping=0.1250, k_dyn_X=4454760.45 N/m, k_dyn_Y=1847925.55 N/m, k_dyn_Z=211715.08 N/m

Mode Shape (X,Y,Z): 0.048∠170.7°, 0.115∠12.9°, 1.000∠167.7°

Mode 2: f=68.00 Hz, Damping=0.1324, k_dyn_X=335879987.03 N/m, k_dyn_Y=194291772.51 N/m, k_dyn_Z=64236484.99 N/m

Mode Shape (X,Y,Z): 0.191∠7.0°, 0.331∠-94.1°, 1.000∠-3.0°

Mode 3: f=88.00 Hz, Damping=0.0341, k_dyn_X=220817269.33 N/m, k_dyn_Y=23498229.16 N/m, k_dyn_Z=102349668.26 N/m

Mode Shape (X,Y,Z): 0.106∠156.8°, 1.000∠-35.5°, 0.230∠-1.4°

Mode 4: f=128.00 Hz, Damping=0.0312, k_dyn_X=264597931.48 N/m, k_dyn_Y=337209707.90 N/m, k_dyn_Z=11963192.16 N/m

Mode Shape (X,Y,Z): 0.045∠23.6°, 0.035∠-149.8°, 1.000∠22.2°

Mode 5: f=150.00 Hz, Damping=0.0267, k_dyn_X=803637793.84 N/m, k_dyn_Y=147530141.14 N/m, k_dyn_Z=35960725.90 N/m

Mode Shape (X,Y,Z): 0.045∠-1.6°, 0.244∠-127.0°, 1.000∠16.1°