Detected Resonant Frequencies (0-200 Hz):

18
40
50
78
88
120
150
178
192

Estimated Damping Ratios:

Mode near 18.00 Hz → ζ = 0.1111
Mode near 40.00 Hz → ζ = 0.1000
Mode near 50.00 Hz → ζ = 0.0600
Mode near 78.00 Hz → ζ = 0.0256
Mode near 88.00 Hz → ζ = 0.0455
Mode near 120.00 Hz → ζ = 0.0250
Mode near 150.00 Hz → ζ = 0.0267
Mode near 178.00 Hz → ζ = 0.0618
Mode near 192.00 Hz → ζ = 0.0156

Normalized Mode Shapes (0-200 Hz):

Mode at 18.00 Hz:
X: 0.268∠8.9°
Y: 0.052∠13.8°
Z: 1.000∠7.9°

Mode at 40.00 Hz:
X: 0.236∠-2.5°
Y: 0.096∠1.9°
Z: 1.000∠-3.3°

Mode at 50.00 Hz:
X: 0.288∠-29.0°
Y: 0.015∠-34.1°
Z: 1.000∠-28.0°

Mode at 78.00 Hz:
X: 0.187∠-29.1°

Y: 0.033∠-28.0°
Z: 1.000∠-36.3°

Mode at 88.00 Hz:
X: 0.262∠169.2°
Y: 1.000∠-17.6°
Z: 0.922∠-174.2°

Mode at 120.00 Hz:
X: 0.111∠-71.9°
Y: 0.078∠-104.9°
Z: 1.000∠-78.1°

Mode at 150.00 Hz:
X: 0.043∠-84.2°
Y: 0.398∠77.2°
Z: 1.000∠-149.2°

Mode at 178.00 Hz:
X: 0.241∠-109.0°
Y: 0.303∠82.8°
Z: 1.000∠-173.0°

Mode at 192.00 Hz:
X: 0.444∠-125.5°
Y: 0.281∠-72.6°
Z: 1.000∠-146.3°
=== Modal Parameter Summary (0-200 Hz) ===

Freq_Hz	Damping	Phi_X	Phi_Y	Phi_Z
18	0.11111	0.2645+0.041432i	0.050688+0.01247i	0.99052+0.1374i
40	0.1	0.2355-0.010169i	0.095838+0.0031726i	0.99835-0.057349i
50	0.06	0.25194-0.13957i	0.012586-0.0085297i	0.88329-0.46883i
78	0.025641	0.16389-0.091054i	0.028872-0.015331i	0.80559-0.59248i
88	0.045455	-0.25782+0.049014i	0.95293-0.3032i	-0.91717-0.093608i
120	0.025	0.034529-0.10568i	-0.020008-0.075235i	0.2068-0.97838i
150	0.026667	0.004354-0.042631i	0.088058+0.38796i	-0.85894-0.51208i
178	0.061798	-0.078366-0.2278i	0.037973+0.30022i	-0.99261-0.12131i
192	0.015625	-0.25775-0.36107i	0.083939-0.26792i	-0.83206-0.55469i

Detected Resonant Frequencies (0-200 Hz):

18
40
50
78
88
120
150
178
192

Estimated Damping Ratios:
0.1111
0.1000
0.0600
0.0256
0.0455
0.0250
0.0267
0.0618
0.0156

=== Modal Summary (0-200 Hz) ===
Mode 1: f=18.00 Hz, Damping=0.1111, k_dyn_X=3285794.29 N/m, k_dyn_Y=16852552.20 N/m, k_dyn_Z=879692.02 N/m
Mode Shape (X,Y,Z): 0.268∠8.9°, 0.052∠13.8°, 1.000∠7.9°
Mode 2: f=40.00 Hz, Damping=0.1000, k_dyn_X=56810672.32 N/m, k_dyn_Y=139654663.57 N/m, k_dyn_Z=13391518.27 N/m
Mode Shape (X,Y,Z): 0.236∠-2.5°, 0.096∠1.9°, 1.000∠-3.3°
Mode 3: f=50.00 Hz, Damping=0.0600, k_dyn_X=16740128.86 N/m, k_dyn_Y=317110932.33 N/m, k_dyn_Z=4821445.41 N/m
Mode Shape (X,Y,Z): 0.288∠-29.0°, 0.015∠-34.1°, 1.000∠-28.0°
Mode 4: f=78.00 Hz, Damping=0.0256, k_dyn_X=58701099.54 N/m, k_dyn_Y=336658171.69 N/m, k_dyn_Z=11005421.16 N/m
Mode Shape (X,Y,Z): 0.187∠-29.1°, 0.033∠-28.0°, 1.000∠-36.3°
Mode 5: f=88.00 Hz, Damping=0.0455, k_dyn_X=308955236.15 N/m, k_dyn_Y=81080386.83

N/m, k_dyn_Z=87945734.40 N/m
Mode Shape (X,Y,Z): 0.262∠169.2°, 1.000∠-17.6°, 0.922∠-174.2°
Mode 6: f=120.00 Hz, Damping=0.0250, k_dyn_X=186174239.71 N/m, k_dyn_Y=265885733.50 N/m, k_dyn_Z=20699178.09 N/m
Mode Shape (X,Y,Z): 0.111∠-71.9°, 0.078∠-104.9°, 1.000∠-78.1°
Mode 7: f=150.00 Hz, Damping=0.0267, k_dyn_X=4081493742.55 N/m, k_dyn_Y=439648152.76 N/m, k_dyn_Z=174903230.15 N/m
Mode Shape (X,Y,Z): 0.043∠-84.2°, 0.398∠77.2°, 1.000∠-149.2°
Mode 8: f=178.00 Hz, Damping=0.0618, k_dyn_X=2053385891.79 N/m, k_dyn_Y=1634618434.68 N/m, k_dyn_Z=494657818.76 N/m
Mode Shape (X,Y,Z): 0.241∠-109.0°, 0.303∠82.8°, 1.000∠-173.0°
Mode 9: f=192.00 Hz, Damping=0.0156, k_dyn_X=613576131.11 N/m, k_dyn_Y=969518590.62 N/m, k_dyn_Z=272201600.33 N/m
Mode Shape (X,Y,Z): 0.444∠-125.5°, 0.281∠-72.6°, 1.000∠-146.3°