HW#4

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Problem#1

Material Properties	Value
Young's modulus (E) $[Pa]$	200e9
Poisson's Ration v	0.3
Density ρ $[kg/m^3]$	8000

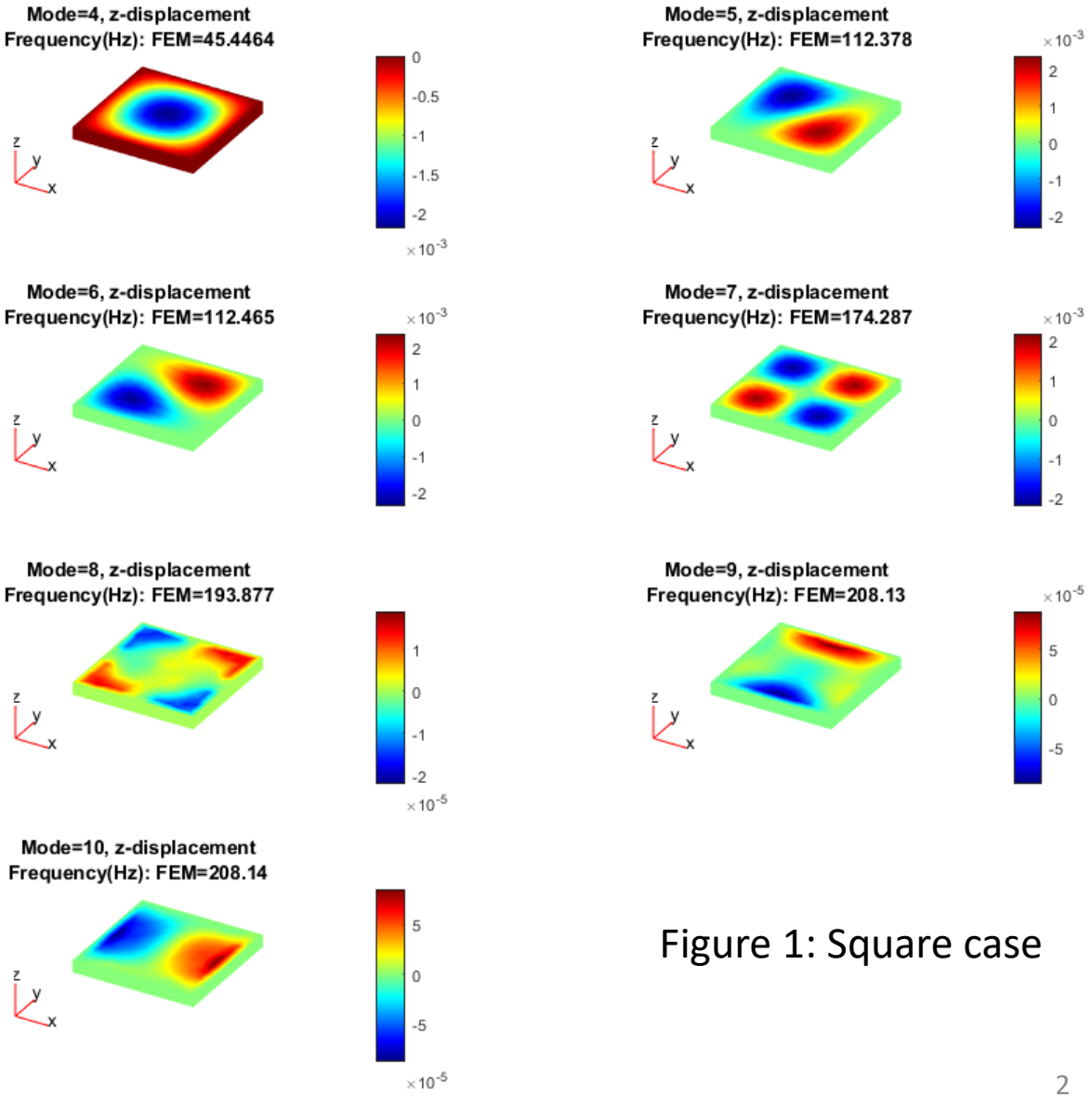


Figure 1: Square case

Problem#2

Material Properties	Value
Young's modulus (E) $[Pa]$	200e9
Poisson's Ration v	0.3
Density ρ $[kg/m^3]$	8000

Base case => Problem#1

Squ case (Hz)	Rect case (Hz)	Squ Ratio	Rect Ratio
45.45	28.79	1.00	1.00
112.38	45.43	2.47	1.58
112.47	73.45	2.47	2.55
174.29	82.16	3.84	2.85
193.88	96.52	4.27	3.35

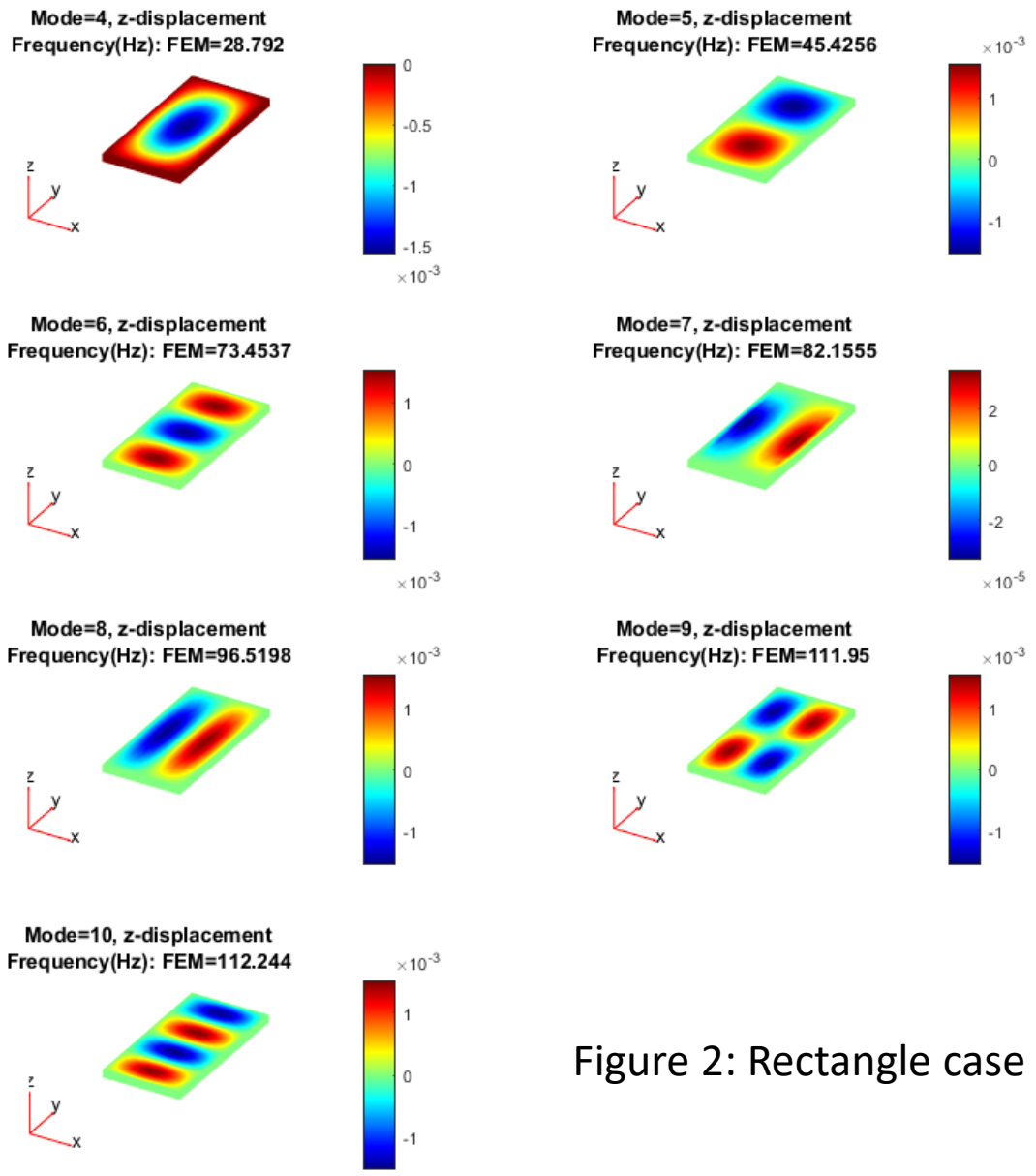
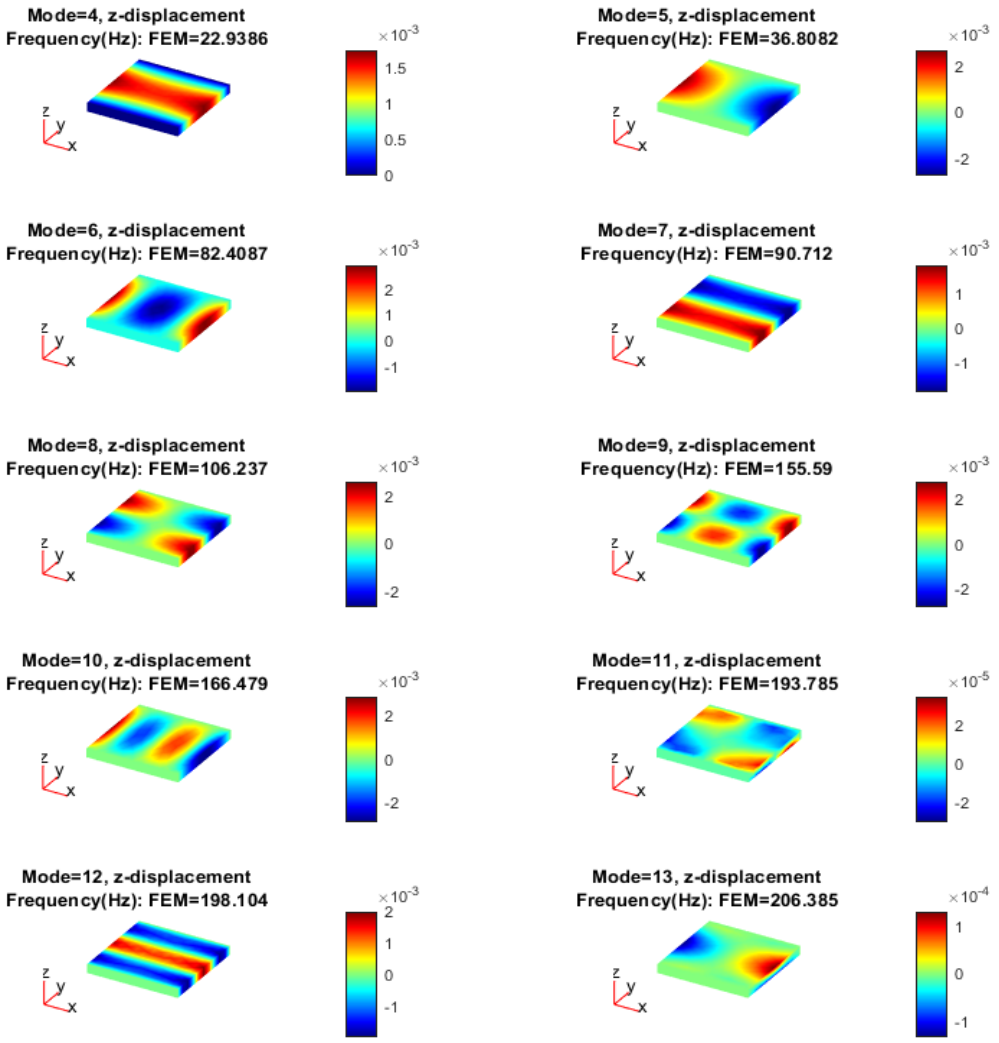


Figure 2: Rectangle case

Problem#3 => Diagonal square



Fix Squ case (Hz)	Dia Squ case (Hz)	Ratio
45.45	22.94	0.50
112.38	36.81	0.33
112.47	82.41	0.73
174.29	90.71	0.52
193.88	106.24	0.55
208.13	155.59	0.75
208.14	166.48	0.80
219.31	193.79	0.88
219.67	198.10	0.90
219.84	206.38	0.94

Figure 3: Diagonal square case

Problem#3 => Diagonal rectangle

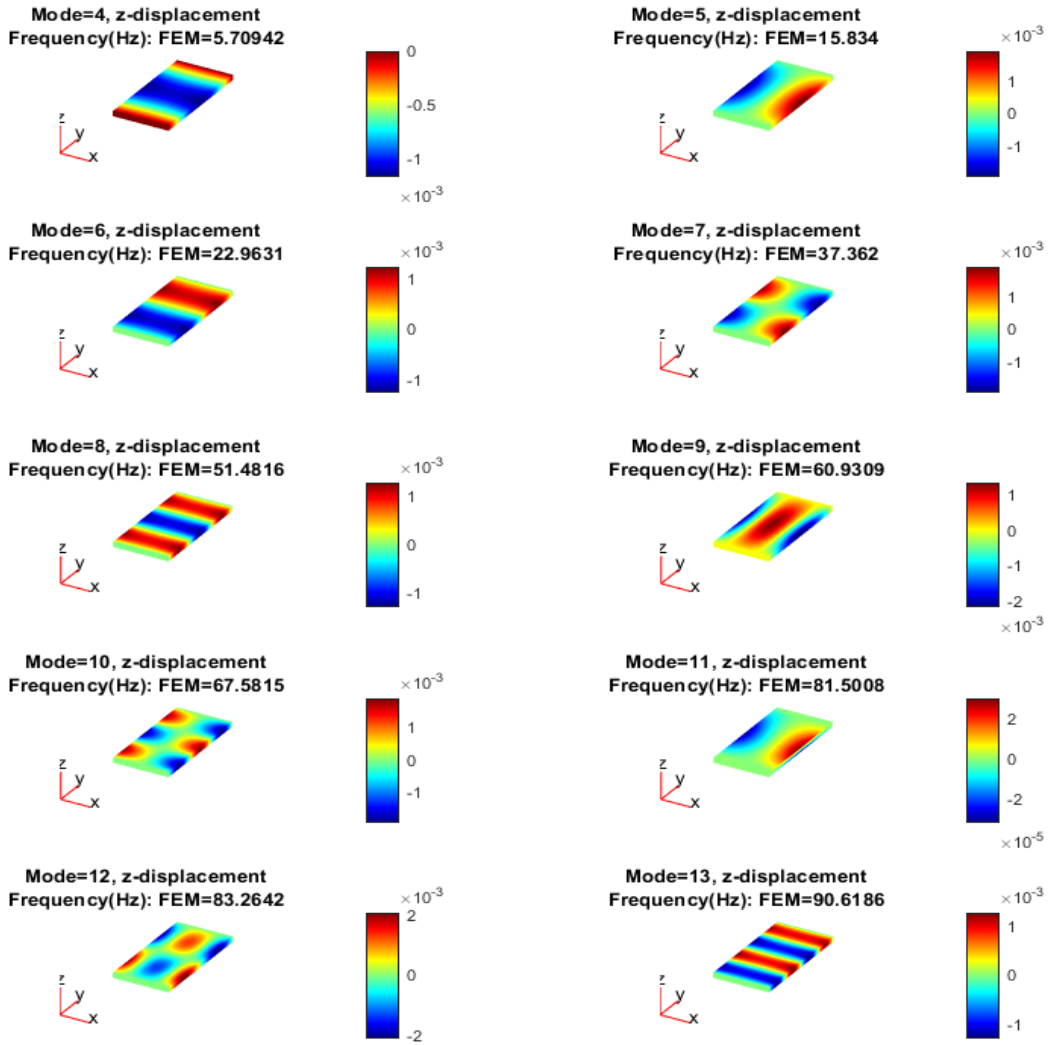


Figure 4: Diagonal rectangle case

Fix Rect case (Hz)	Dia Rect case (Hz)	Ratio
28.79	5.71	0.20
45.43	15.83	0.35
73.45	22.96	0.31
82.16	37.36	0.45
96.52	51.48	0.53
111.95	60.93	0.54
112.24	67.58	0.60
123.94	81.50	0.66
137.43	83.26	0.61
138.01	90.62	0.66

Problem#4

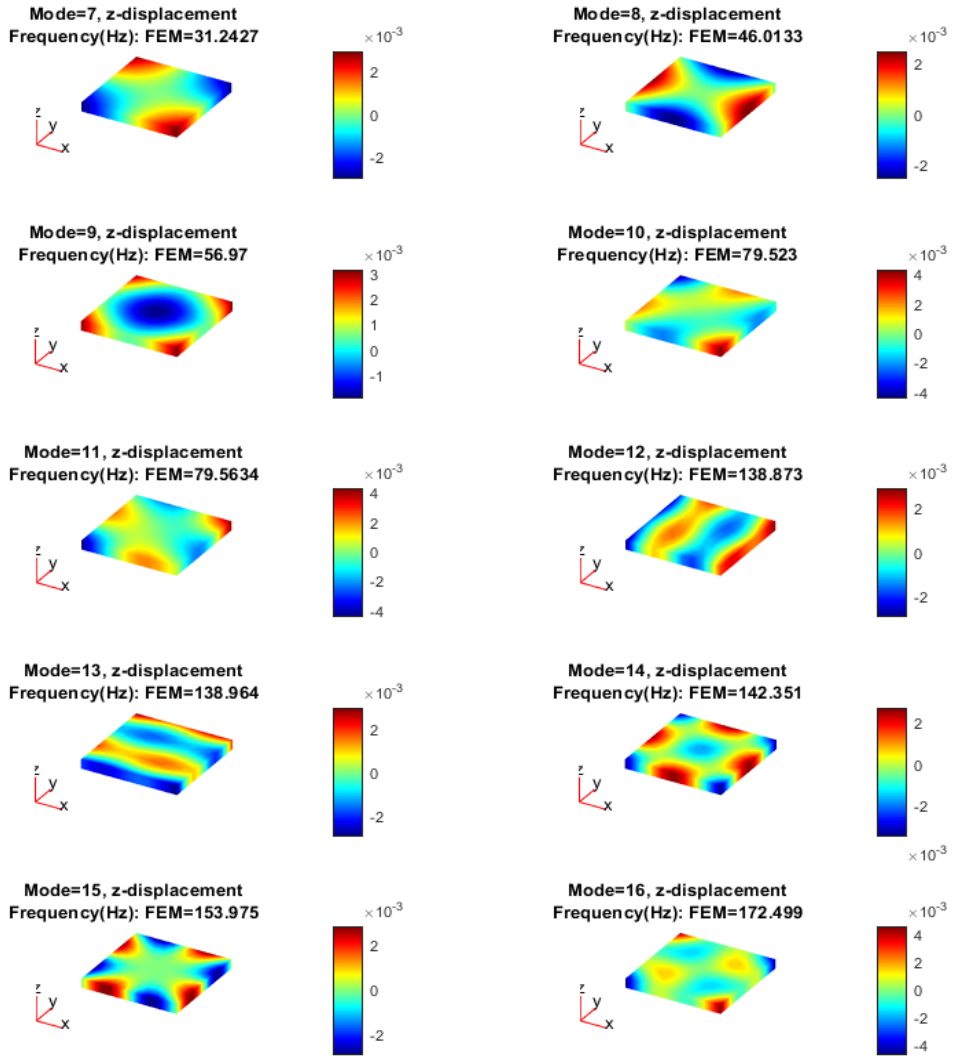
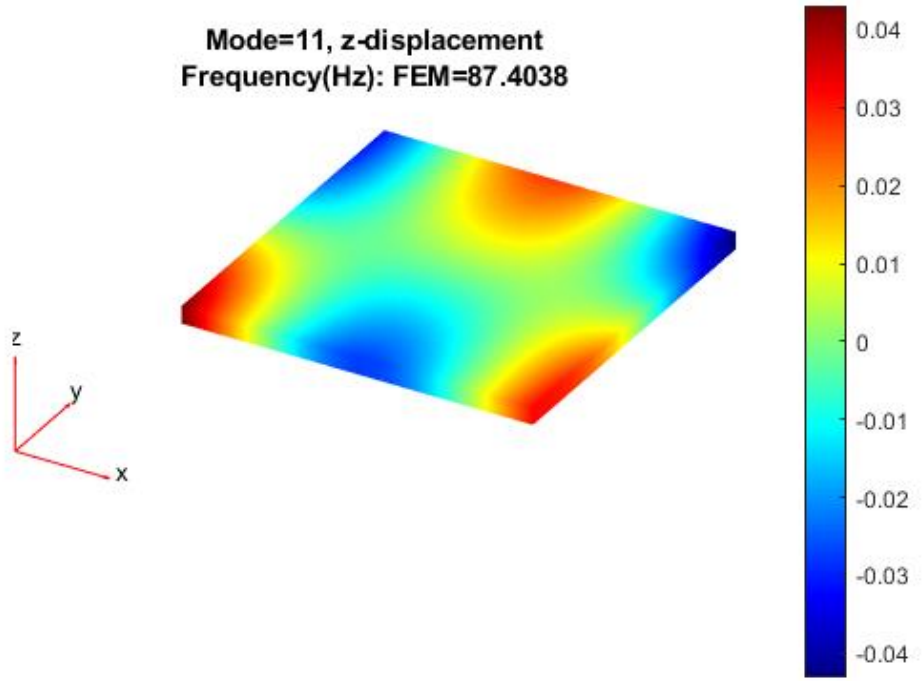


Figure 5: Free square case

Fix Squ case (Hz)	Free Squ case (Hz)	Ratio
45.45	31.24	0.69
112.38	46.01	0.41
112.47	56.97	0.51
174.29	79.52	0.46
193.88	79.56	0.41
208.13	138.87	0.67
208.14	138.96	0.67
219.31	142.35	0.65
219.67	153.98	0.70
219.84	172.50	0.78

Problem#5 => Mode = 11



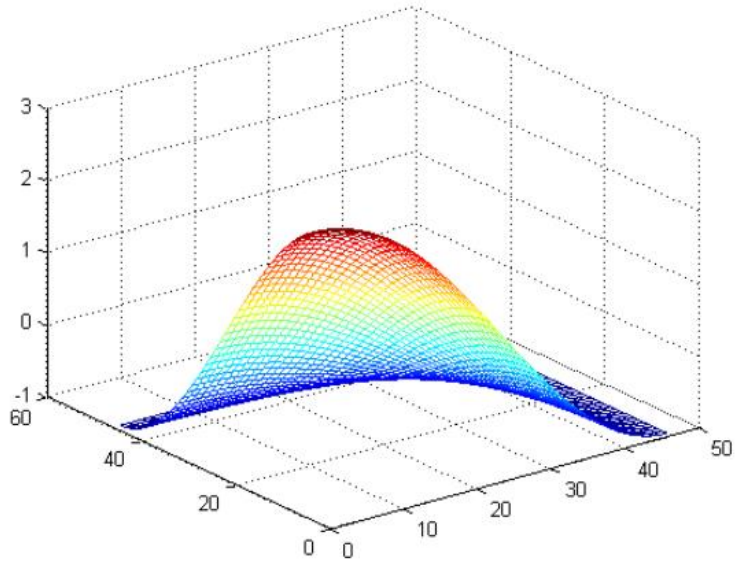
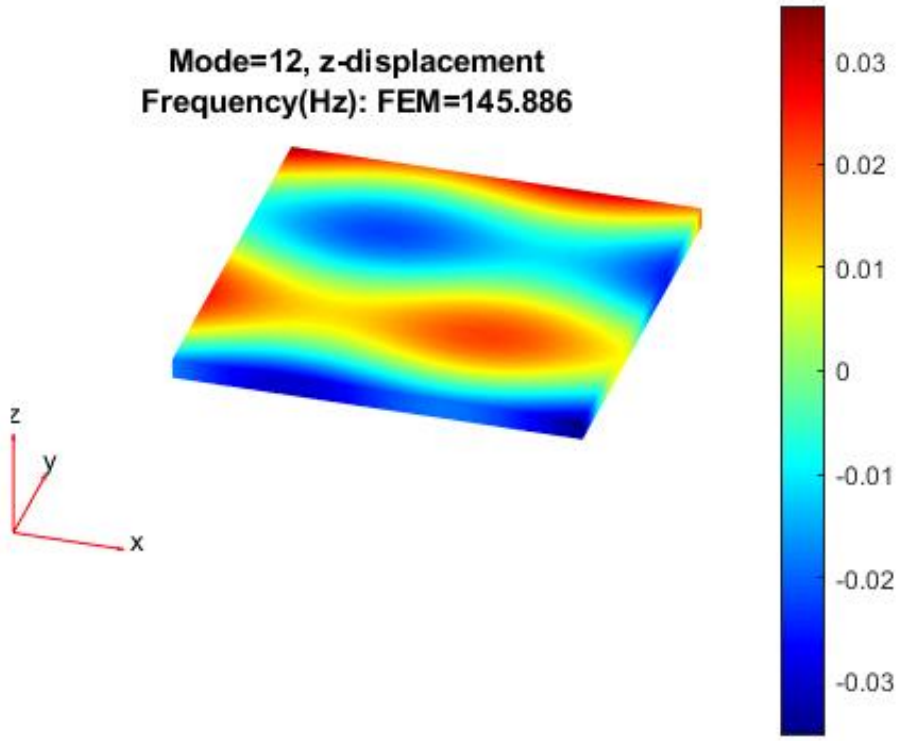


Figure 1 the 11 order vibration mode

Figure 6: Comparison between
Student version and Research result
at mode#11

Problem#5 => Mode = 12



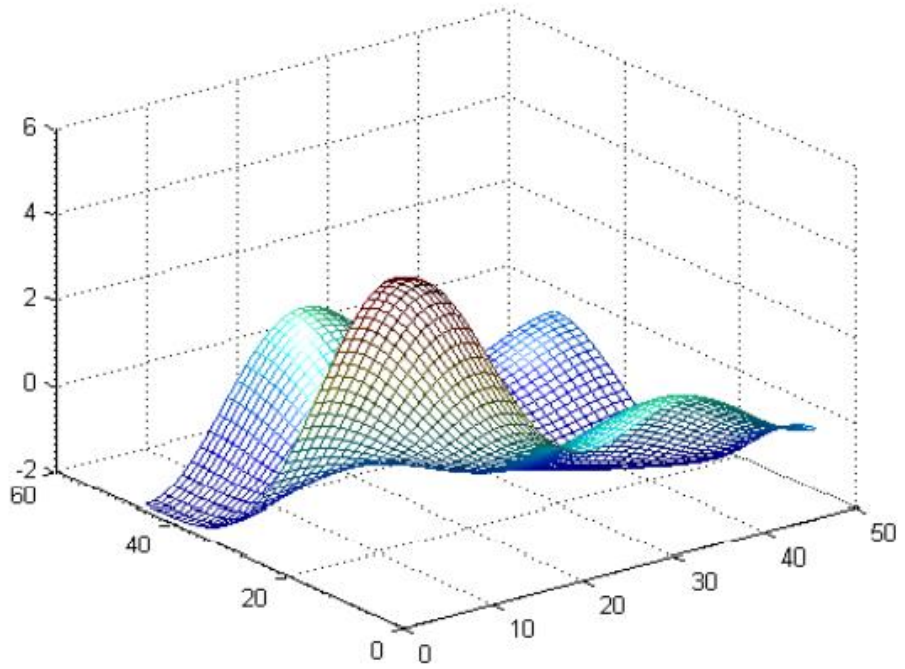
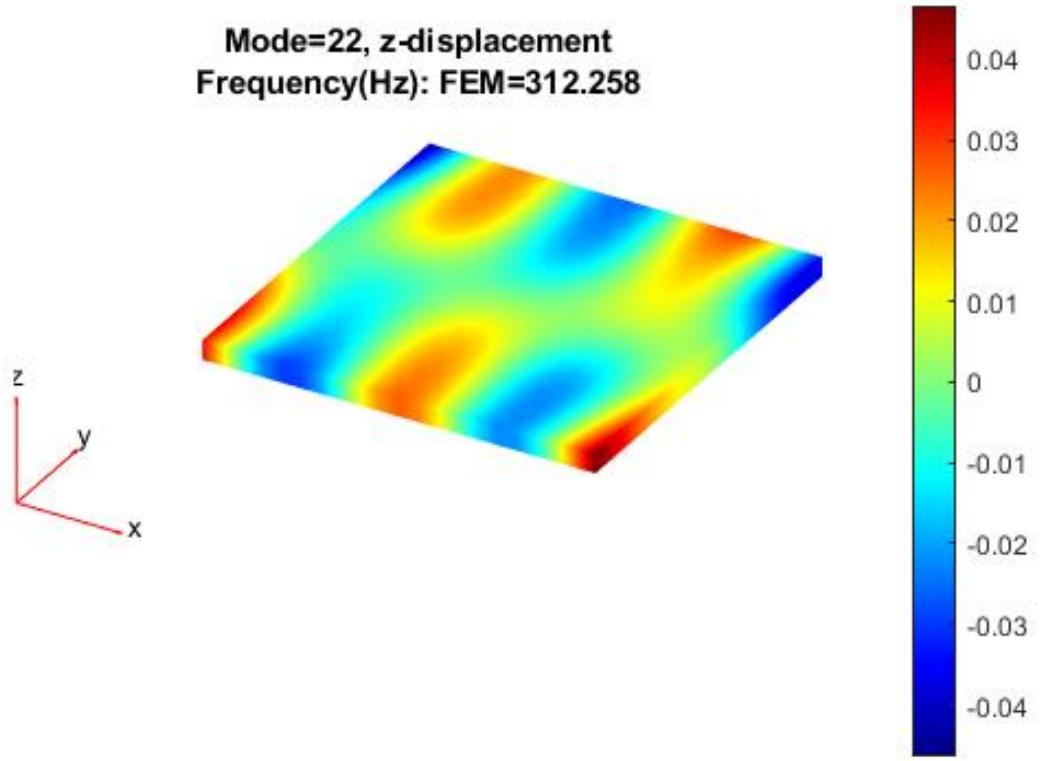


Figure 2 the 12 order vibration mode

Figure 7: Comparison between Student version and Research result at mode#12

Problem#5 => Mode = 22



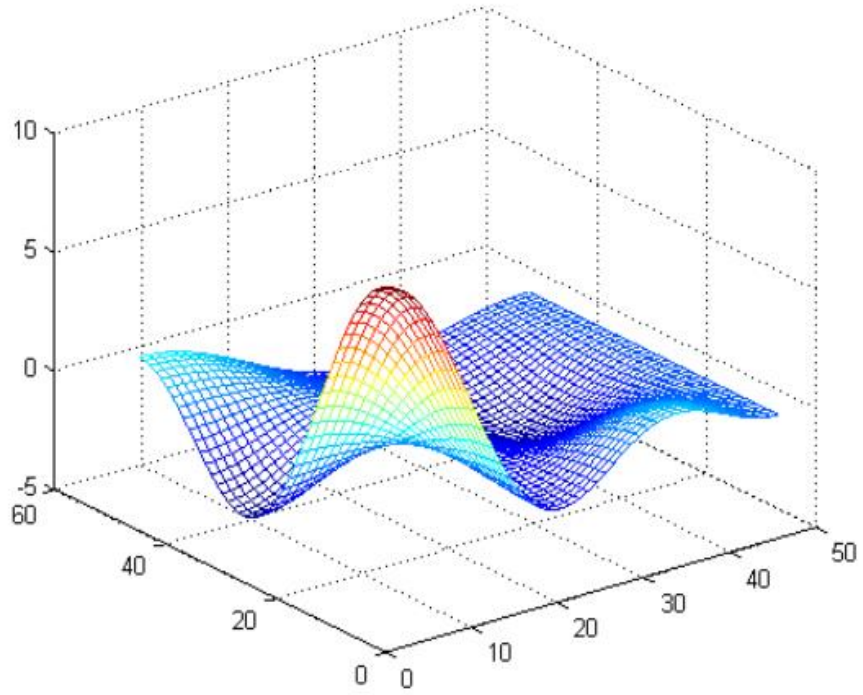
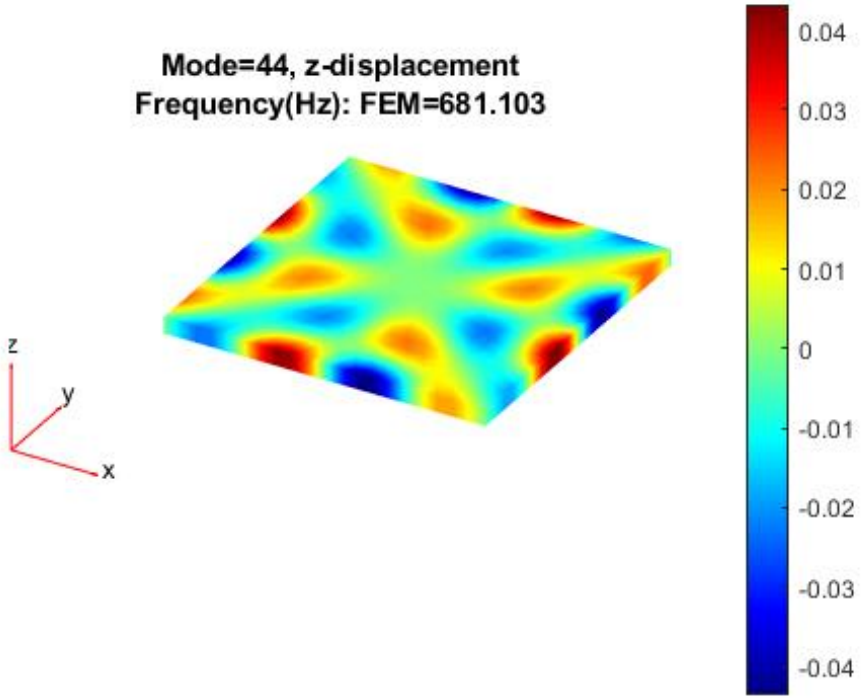


Figure 3 the 22 order vibration mode

Figure 8: Comparison between Student version and Research result at mode#22

Problem#5 => Mode = 44



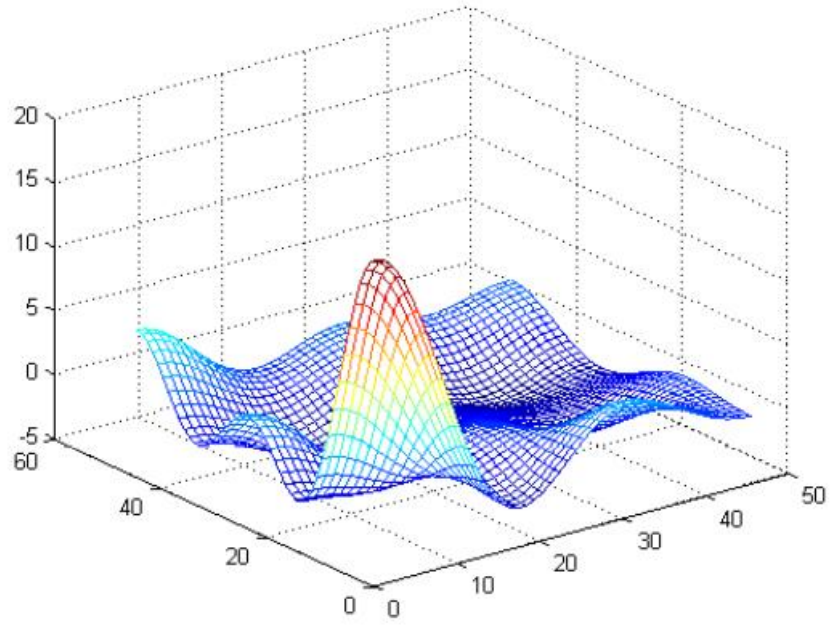


Figure 4 the 44 order vibration mode

Figure 9: Comparison between Student version and Research result at mode#44

Problem#5 => Conclusion

The result from student and research are not identical. The reason behind this phenomena could be the result from various parameters: number of element in X, Y, and Z axis. From Figure 10, the difference between results at mode 12 using number of element of {16,16,10} and {50,50,10} is visible.

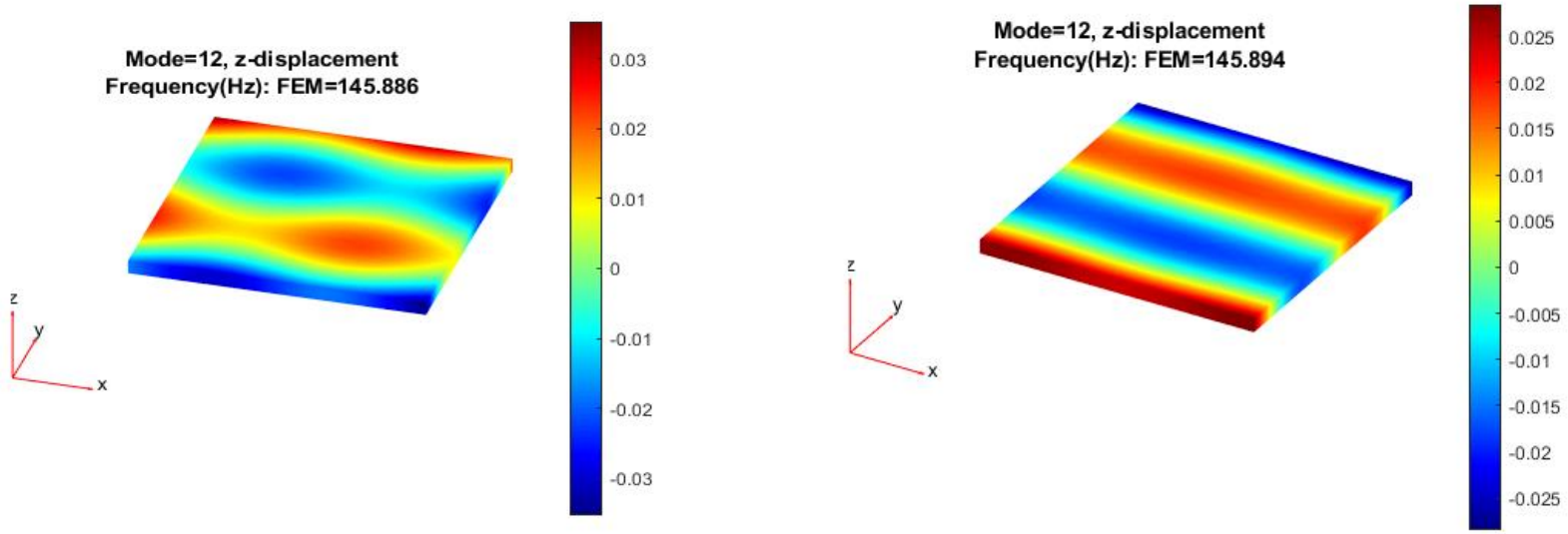


Figure 10: Difference between results at mode 12 using number of element of {16,16,10} and {50,50,10}