

Free annular membrane

REFERENCE	Selected Benchmarks for Natural Frequency Analysis, Issue 2, NAFEMS, Glasgow, 1987
MODEL FILENAME	Free Annular Membrane.nfx

Figure 1 shows an unconstrained annular membrane problem. Membrane elements are employed to obtain the lowest vibration frequencies except for the rigid body modes. The results are compared with the reference values provided in the NAFEMS benchmarks.

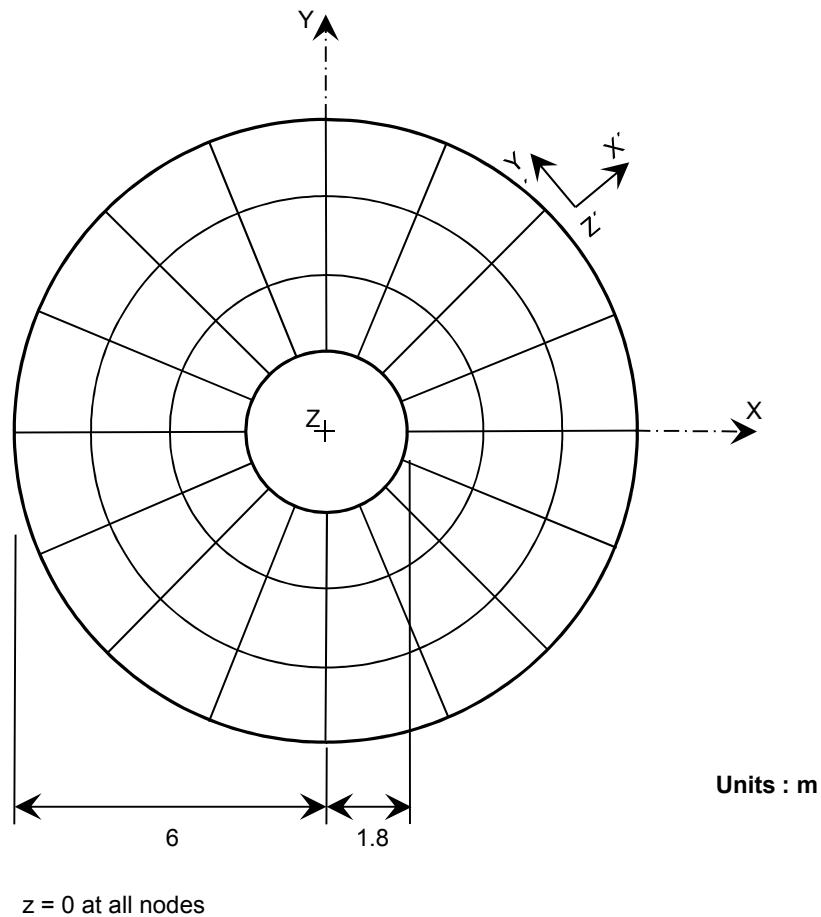


Figure 1. Free annular membrane model

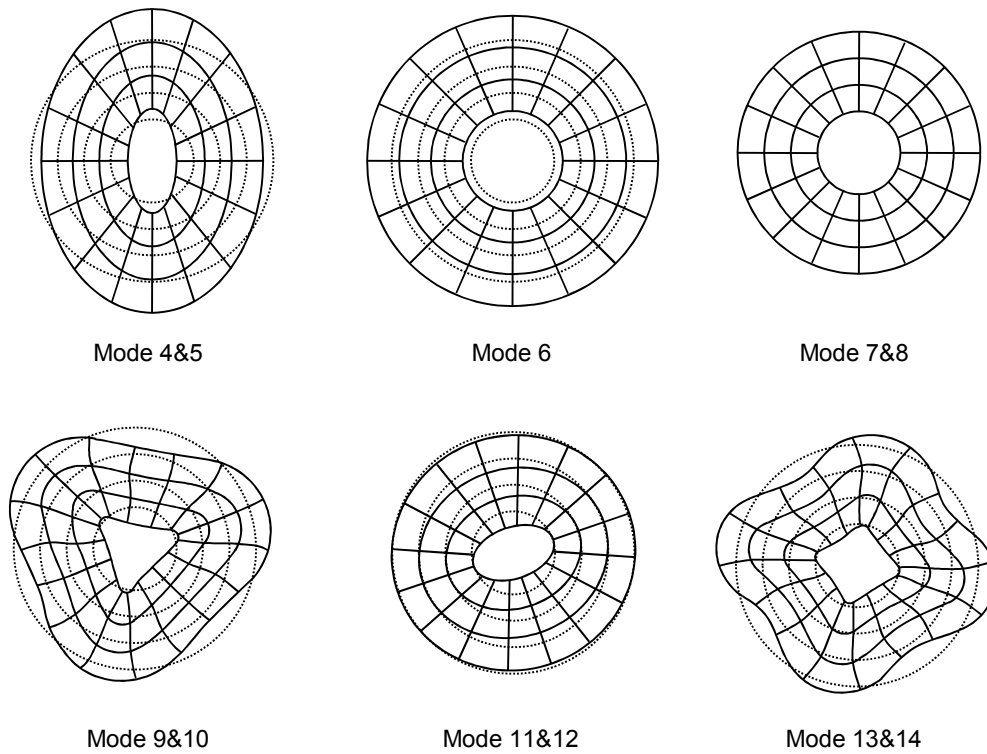


Figure 2. Vibration mode shapes

Material data	Young's modulus	$E = 200 \text{ GPa}$
	Poisson's ratio	$\nu = 0.3$
	Density	$\rho = 8000 \text{ kg/m}^3$
Section property	Thickness	$t = 0.6 \text{ m}$

Table 1. Natural frequencies in Hz obtained using membrane elements

Mode Number		4,5	6	7,8	9,10	11,12	13,14
Reference		129.24	226.17	234.74	264.66	336.61	376.79
Element type	Number of elements						
QUAD-4	3x16	128.64	225.22	234.87	270.75	339.87, 339.88	389.29