Description :

Simply Supported Circular plate with point load at the center.

Reference :

S.Timoshenko , S . Woinowsky , Theory of Plates and Shells , pg:68, Article : 19 .

Material and Geometric data :

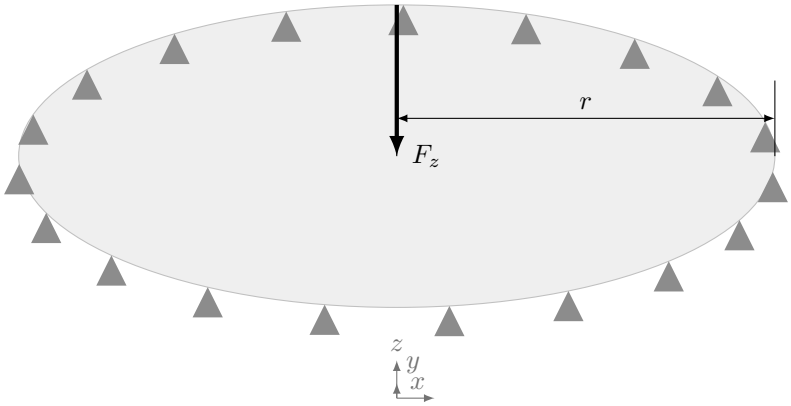

Figure 1: TIM68

Table 1: Input Data

Material Property		Geometric Data		Loading Data	
Young's Modulus (E)	5E11 Pa	Radius (r)	1 m	Point Load (F_z)	1000 N
Poission's Ratio (ν)	0.3	Thickness(t)	0.01 m		

Mesh and boundary condition :

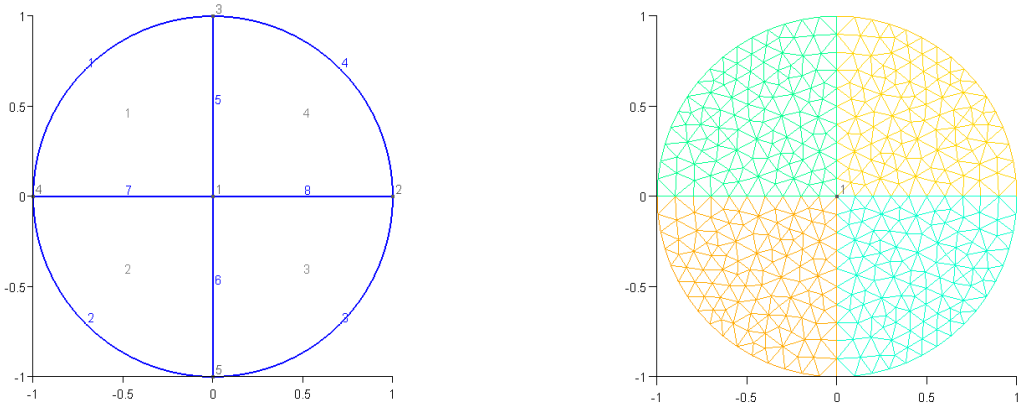

Figure 2: Geomentry and Mesh of TIM68

Table 2: FEM and Boundary condition data

Direchlet Boundary				Neumann Boundary			
Geo -Entity	w	θ_x	θ_y	Geo -Entity	F_z	M_x	M_y
line {1,2,3,4}	Fixed	Free	Free	Point {1}	-1000 N		

Analytically solution :

The target analytically solution given as

$$w_{at\_center} = \frac{F_z}{16\pi D}\left[\frac{(3+\nu)r^2}{1+\nu}\right] \tag{1}$$

Result and error analysis :

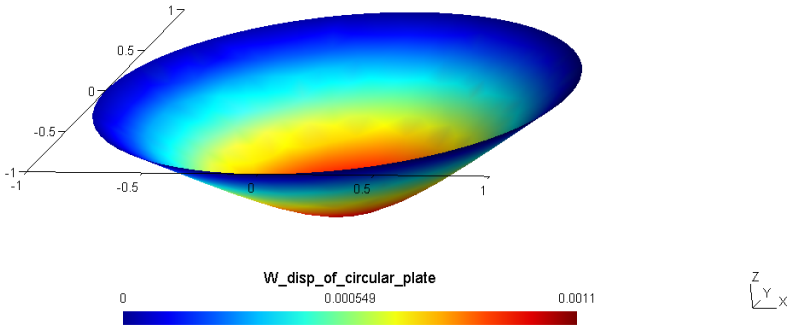

Figure 3: FEM solution plot

The maximum displacement of the domain is our solution . w displacement at center is $-0.0010983in$.

So the Error percentage is 0.42103%.