Large Deflection of a Circular Plate With Uniform Pressure

Overview

Reference:	Timoshenko S.P., Woinowsky-Krieger S., *Theory of Plates and Shells*, McGraw-Hill, 2nd Edition, Article 97, equation 232, pg. 401
Solver(s):	ANSYS Mechanical
Analysis Type(s):	Nonlinear Structural Analysis (Large Deformation On)
Element Type(s):	Shell

Test Case

A circular plate is subjected to a uniform pressure on its flat surface. The circular edge of the plate is fixed. To get accurate results, apply sizing control with element size of 5 mm on the circular edge.

Find the total deformation at the center of the plate.

Figure 21: Schematic
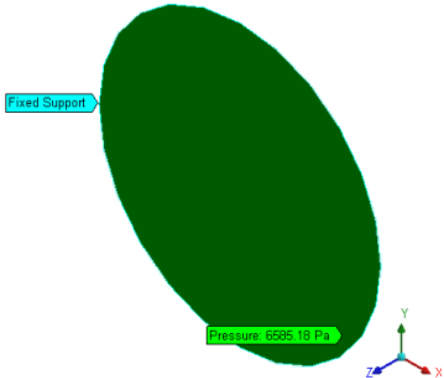
Material Properties	Geometric Properties	Loading
E = 2e11 Pa v = 0.3	Radius = 0.25 m Thickness = 0.0025 m	Pressure = 6585.18 Pa

Results Comparison

Results	Target	Mechanical	Error (%)
Total deformation (m)	0.00125	0.0012364	-1.088