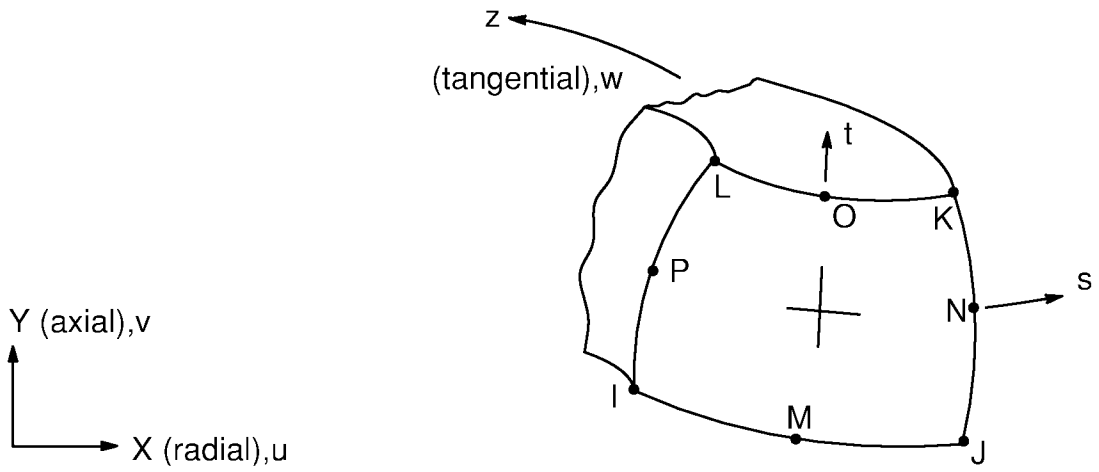
14.83 PLANE83 — 8–Node Axisymmetric–Harmonic Structural Solid



Matrix or Vector	Geometry	Shape Functions	Integration Points
Stiffness Matrix	Quad	Equations (12.7.7–1), (12.7.7–2), and (12.7.7–3)	2 x 2
	Triangle	Equations (12.7.2–1), (12.7.2–2), and (12.7.2–3)	3
Mass Matrix	Quad	Equations (12.6.7–1), (12.6.7–2), and (12.6.7–3)	2 x 2
	Triangle	Equations (12.6.2–1), (12.6.2–2), and (12.6.2–3)	3
Stress Stiffness Matrix	Same as stiffness matrix		Same as stiffness matrix

Matrix or Vector	Geometry	Shape Functions	Integration Points
Thermal Load Vector	Same as stiffness matrix		Same as stiffness matrix
Pressure Load Vector	Same as stiffness matrix, specialized to the face		2

Load Type	Distribution
Element Temperature	Same as shape functions across element, harmonic around circumference
Nodal Temperature	Same as element temperature distribution
Pressure	Linear along each face, harmonic around circumference

Reference: Zienkiewicz(39)

14.83.1 Other Applicable Sections

Chapter 2 describes the derivation of structural element matrices and load vectors as well as stress evaluations. Section 13.1 describes integration point locations. Section 14.25 has a discussion of temperature applicable to this element.

14.83.2 Assumptions and Restrictions

A dropped midside node implies that the edge is and remains straight.

The material properties are assumed to be constant around the entire circumference, regardless of temperature–dependent material properties or loading. For MODE > 0, extreme values for combined stresses are obtained by computing these stresses at every 10/MODE degrees and selecting the extreme values.