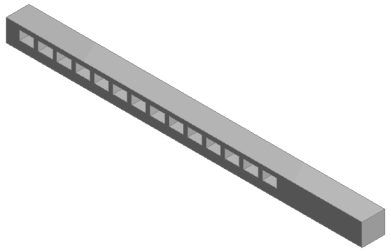
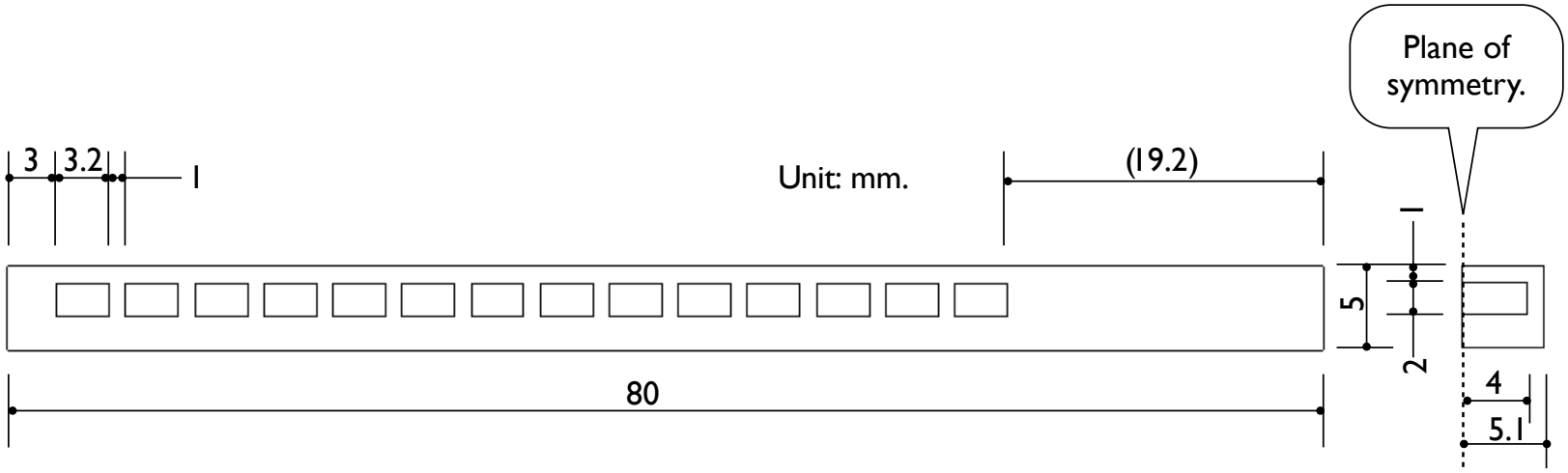
Chapter 9
Meshing

Section 9.1

Pneumatic Fingers

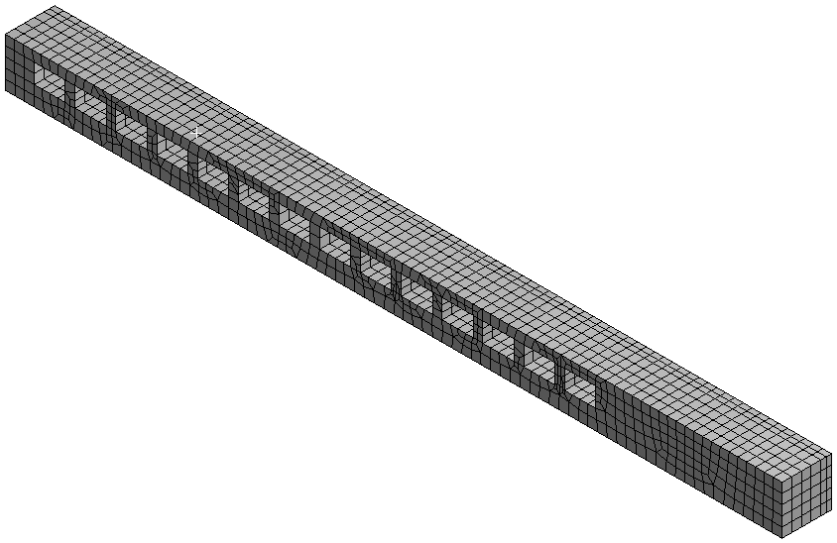


Problem Description



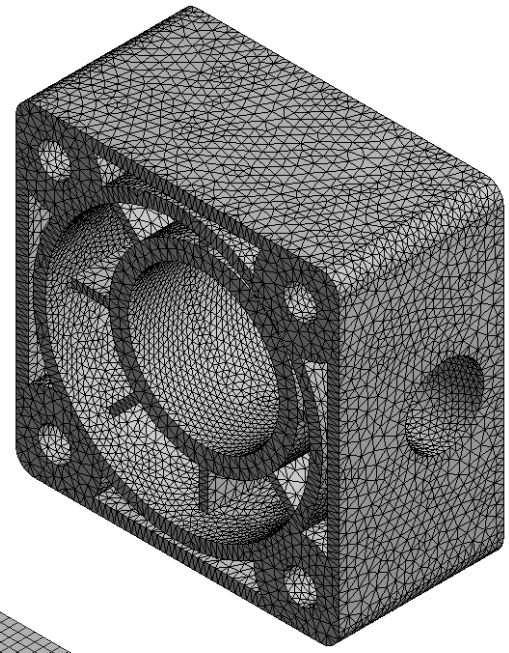
Techniques/Concepts

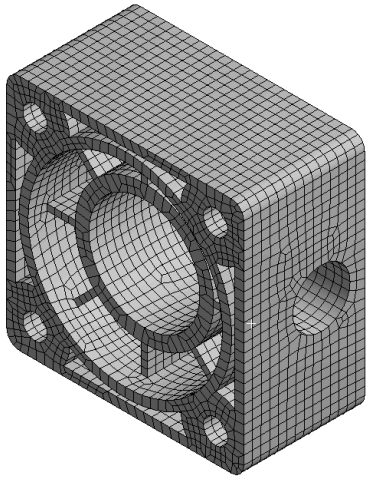
- Mesh Metric: Skewness
- Hex Dominant Method
- Sweep Method
- MultiZone Method
- Section View



Section 9.2

Cover of Pressure Cylinder





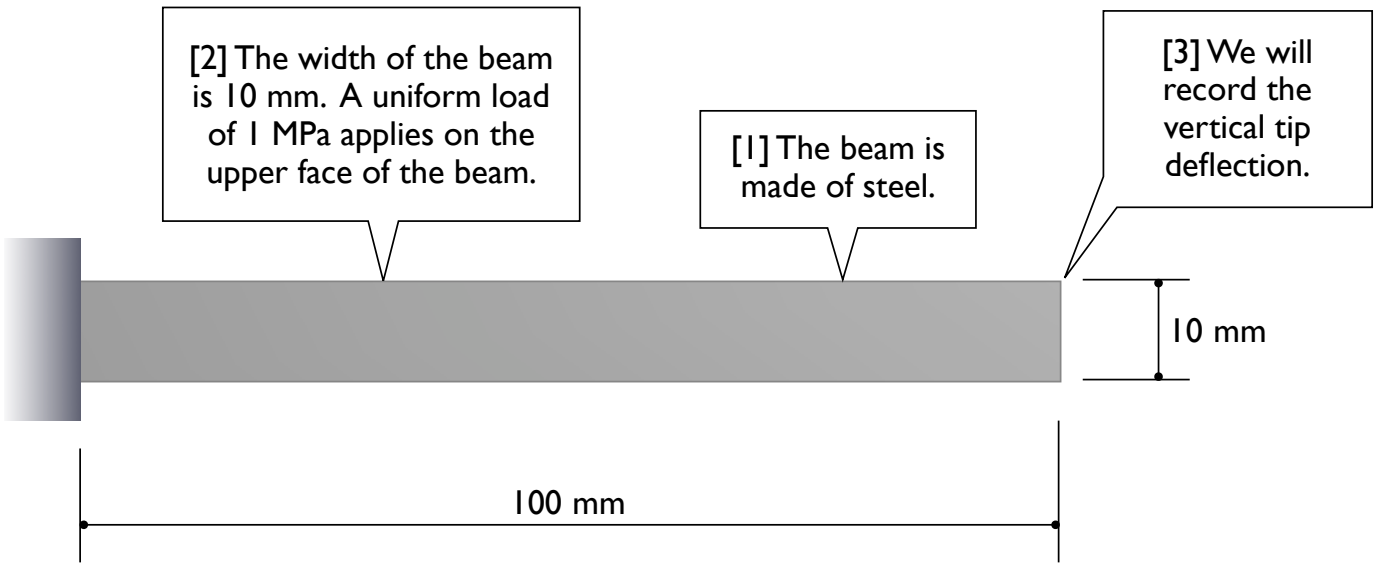
Techniques/Concepts

- Patch Conforming Method
- Patch Independent Method

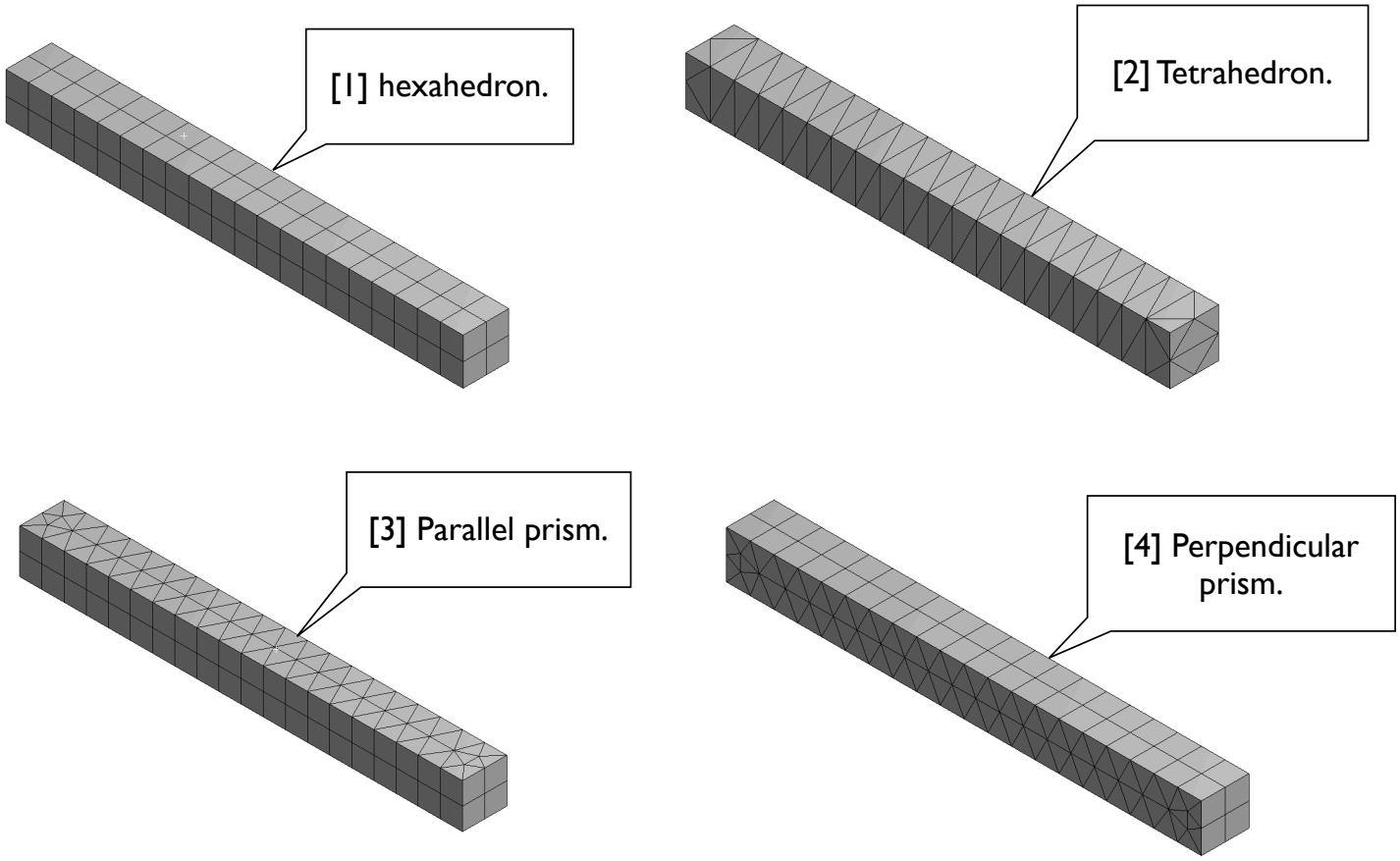
Section 9.3

Convergence Study of 3D Solid Elements

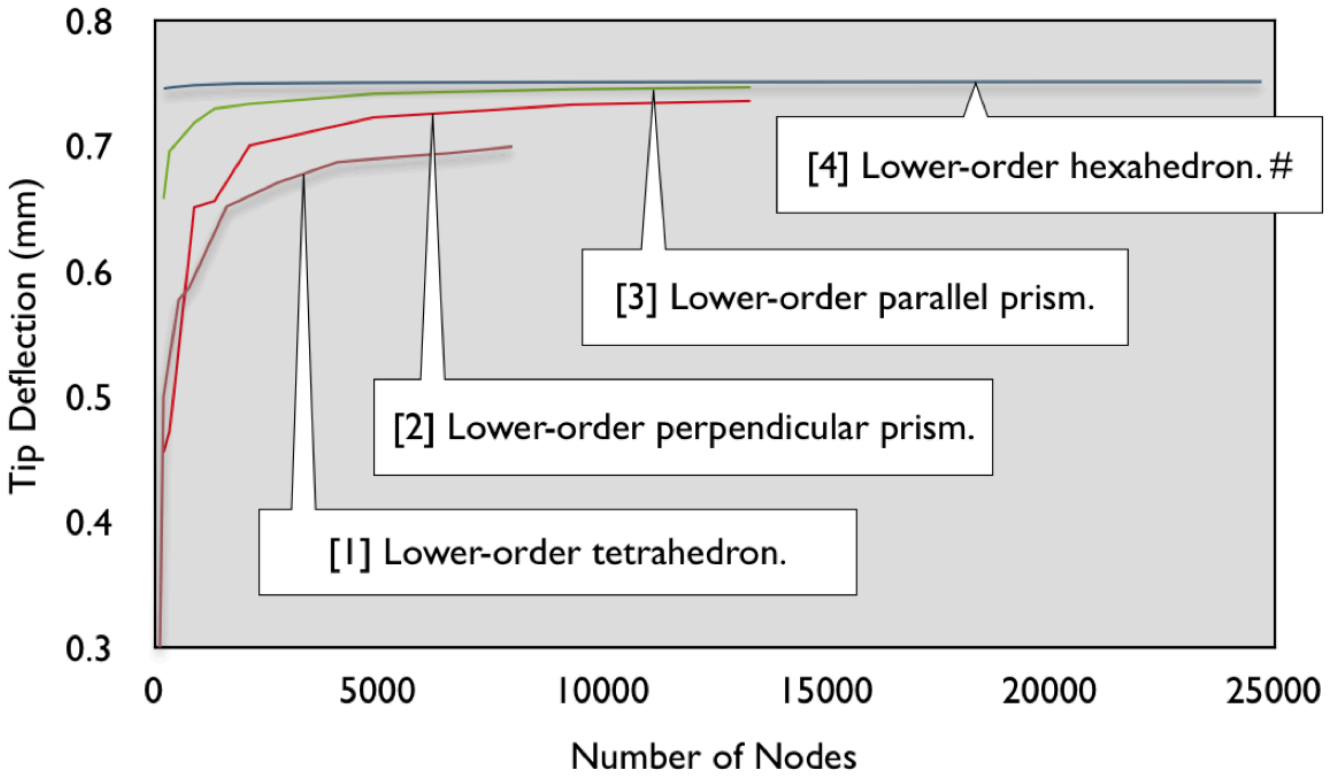
Problem Description



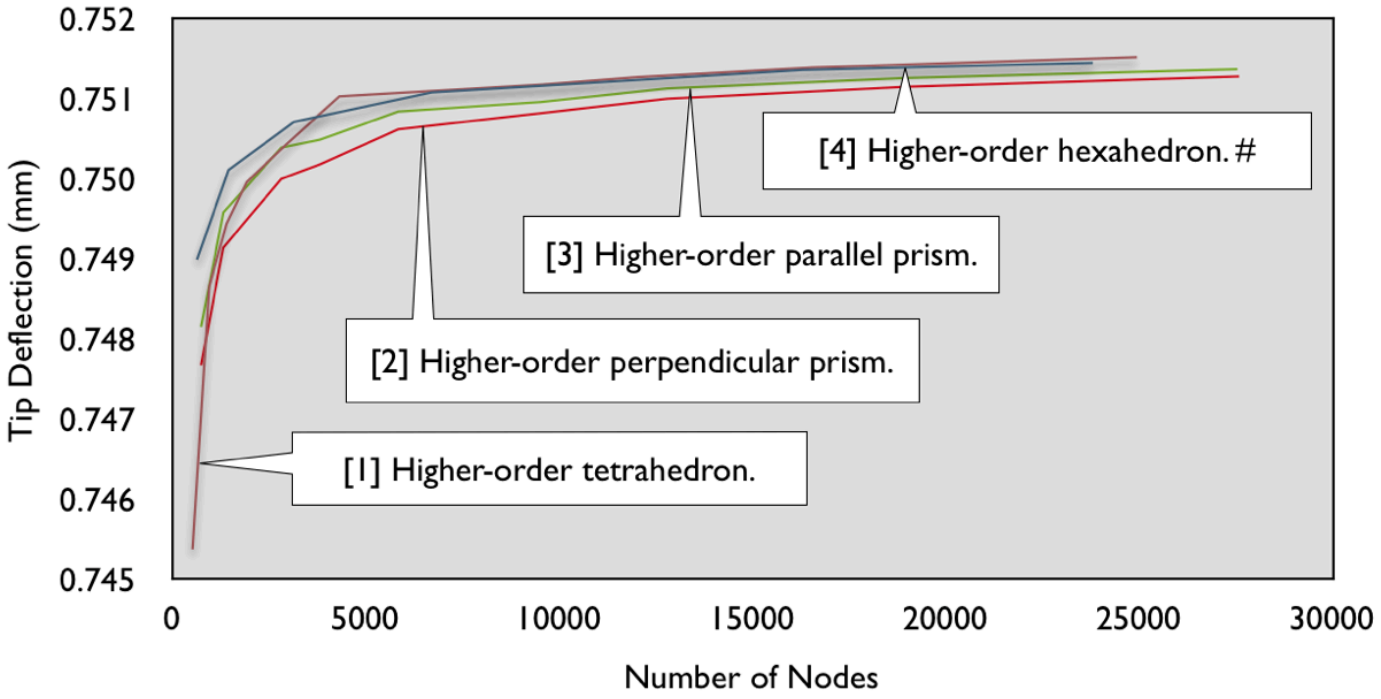
Element Shapes



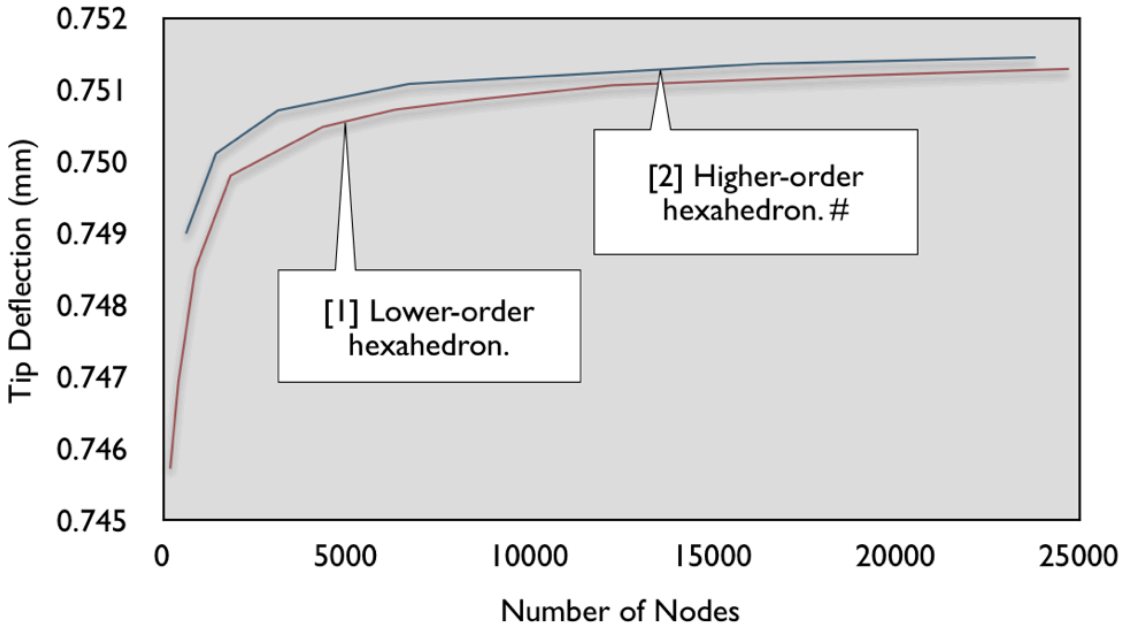
Lower-Order Elements

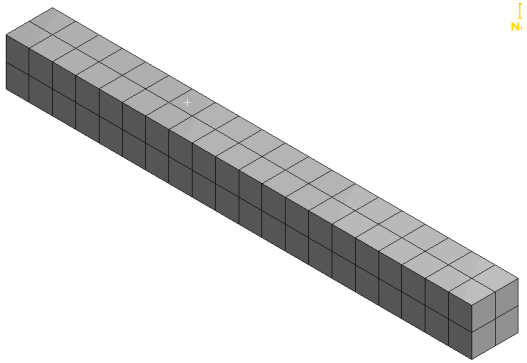


Higher-Order Elements

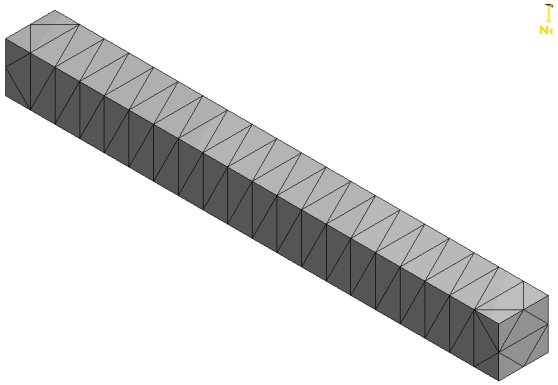


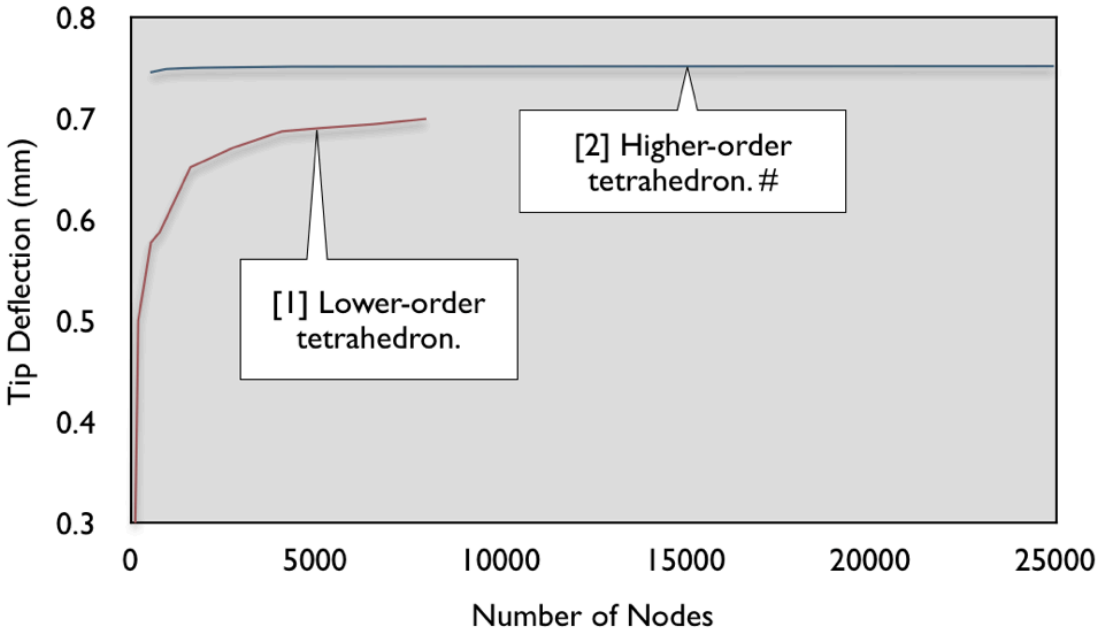
Hexahedra


0.752
0.751
0.750
0.749
0.748
0.747
0.746
0.745
Tip Deflection (mm)
0
5000
10000
15000
20000
25000
Number of Nodes
[1] Lower-order hexahedron.
[2] Higher-order hexahedron. #

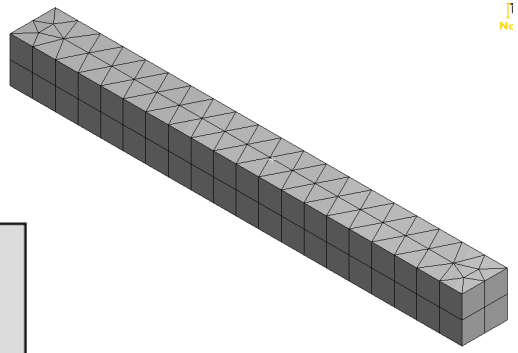


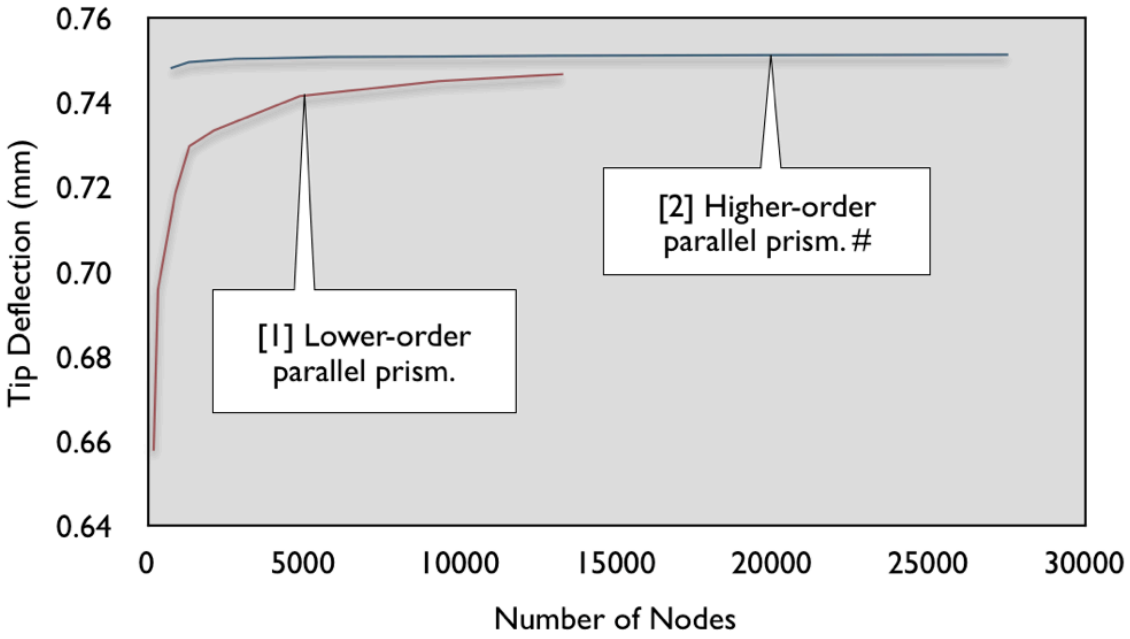
Tetrahedra



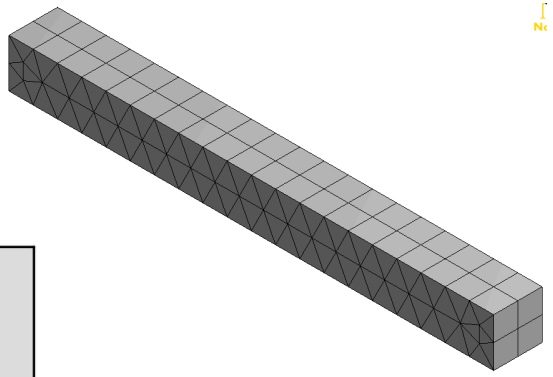

0.8
0.7
0.6
0.5
0.4
0.3
Tip Deflection (mm)
0
5000
10000
15000
20000
25000
Number of Nodes
[2] Higher-order tetrahedron. #
[1] Lower-order tetrahedron.

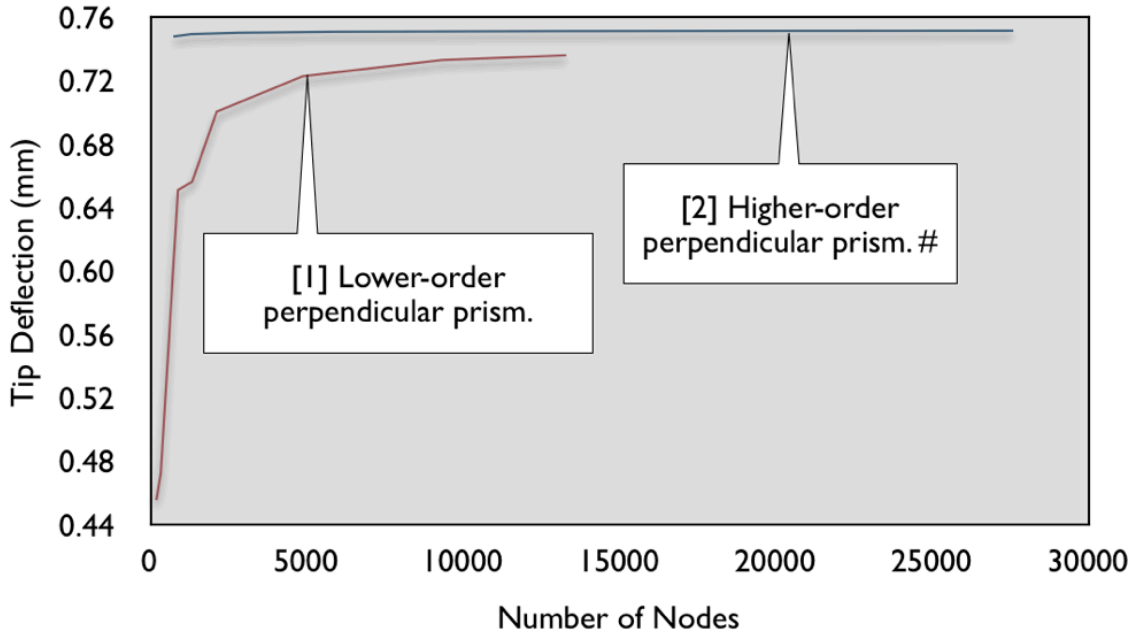
Parallel Prisms





Perpendicular Prisms





Guidelines

- Never use lower-order tetrahedra/triangles.
- Higher-order tetrahedra/triangles can be as good as other elements as long as the mesh is fine enough. In cases of coarse mesh, however, they perform poorly and are not recommended.
- Lower-order prisms are not recommended.
- Lower-order hexahedra/quadrilaterals can be used, but they are not as efficient as their higher-order counterparts.
- Higher-order hexahedra, prisms, and quadrilaterals are among the most efficient elements so far we have discussed. Mesh your models with these elements whenever possible. If that is not possible, then at least try to achieve a higher-order hexahedra-dominant or quadrilateral-dominant mesh.