Chapter 5: Tetra Meshing
Tetrameshing: Standard Tetrameshing

- **Standard tetrameshing:** 3D > *tetramesh* panel > *Tetra Mesh* sub-panel

- **Process:**
  - Generate a surface mesh of shell elements
  - Check quality and connectivity of the plate elements
  - Generate the tetrahedral mesh
  - Delete the original surface mesh
  - Edit if necessary to obtain good quality
Tetrameshing: Standard Tetrameshing

• Requirements for the shell mesh:
  • Enclose one, and only one, continuous volume
  • There can be no free edges. (Otherwise not a solid geometry)
  • There can be no T-connected edges.
  • There can be no duplicates in the mesh.
  • Elements should not fold over and overlap each other
  • Avoid very low minimum tria angles
  • Avoid a large difference in size between adjacent elements
  • Avoid a large difference in size between two sides of a wall thickness

• For quad elements in the shell mesh:
  • Can split quads into 2 trias and create tetra elements under them
    – OR –
  • Can keep the quad element and create pyramids under them
**Tetrameshing: Standard Tetrameshing**

- **Floatable Trias:**
  - Adjacent tria faces on the tetrahedral mesh may have their diagonal reversed from the shell mesh if tetras are better quality.

- **Fixed Trias:**
  - Adjacent tria faces on the tetrahedral mesh always match the shell mesh.
Tetrameshing: Volume Tetrameshing

- Volume tetrameshing: **tetramesh** panel > **Volume tetra** sub-panel
  
  **Mesh > Create > Tetra Mesh**

- Provides a quick method of generating a tetramesh

- Has some specialized options:
  - *Use Proximity* – Creates smaller elements next to small features to make a smooth transition from small to large
  - *Use Curvature* – Will place more elements along curved surfaces based on user specified settings
Tetrameshing: Volume Tetrameshing

- **Use proximity** and **use surface curvature** options

![Mesh examples](images)
Tetrameshing: Quick Tetramesh

- **Geom/Mesh** page of the Utility menu

- Provides a quick method of generating a tetramesh

- Maintains specified minimum element quality criteria
  - Resulting tetramesh may deviate from the geometry to maintain good element quality
  - User can select “sacred elements” or “sacred surfaces” to force the tetramesh to closely follow the original elements/surfaces

- Click **Help** on the **Quick Tetramesh** panel for a description of the inputs