Tetra Meshing Introduction
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

  ![Shell Mesh](image1) ![Tetra Mesh Faces](image2)

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

  ![Shell Mesh](image3) ![Tetra Mesh Faces](image4)
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

- **No options**
- **Use surface curvature**
- **Use proximity**
- **Use surface curvature and proximity**
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