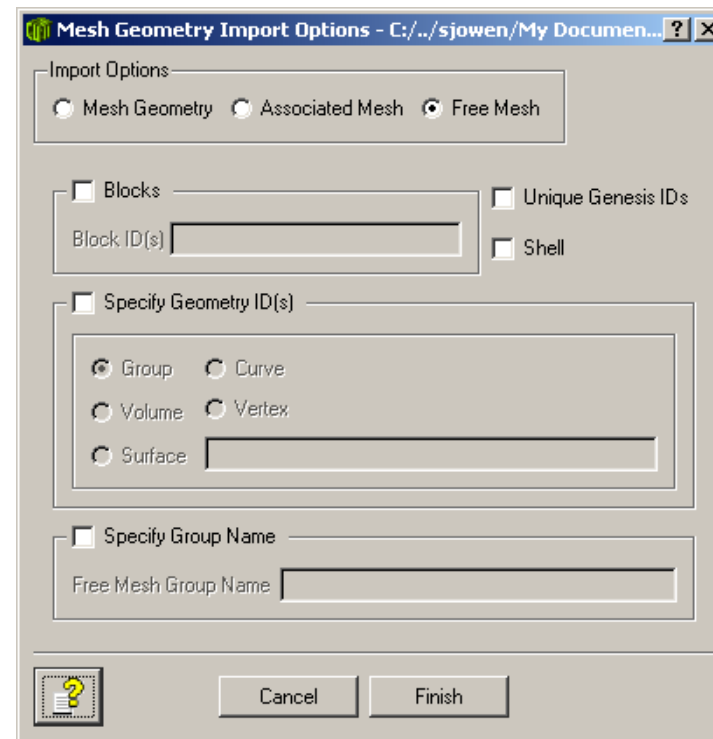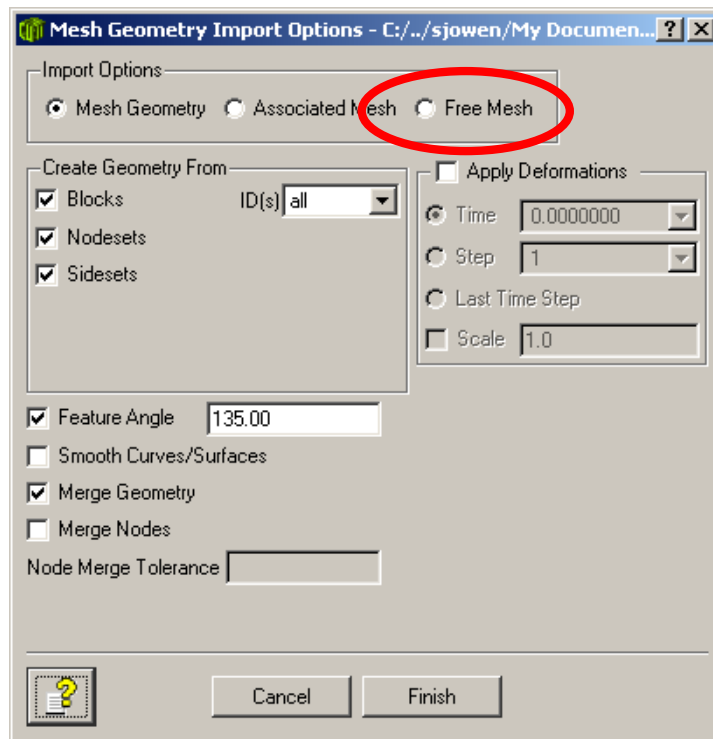# MESHING

- **Free meshes / Adaptive sizing**

  – Requires time-dependent variable in Exodus II file

- **Tet cleanup**

  – Unlike "smooth", maintains topology

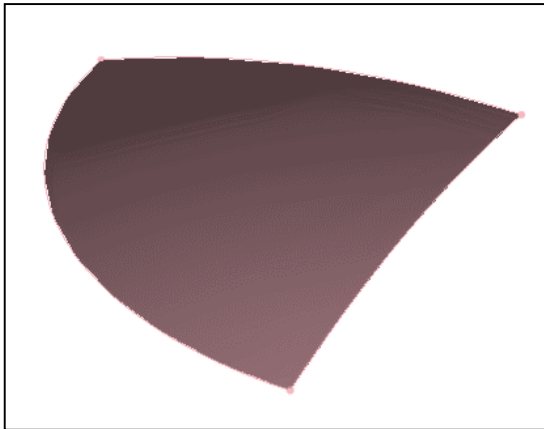- **Edge length smoother/metric**

- **Mesh pillowing**

Steve Owen

Free Mesh Import
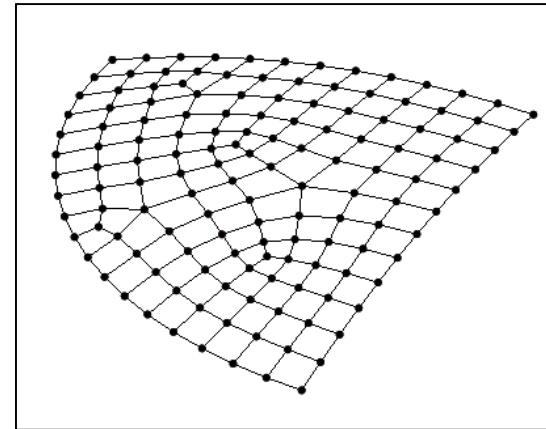
Free Mesh
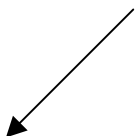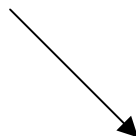
Geometry

Mesh

Mesh Owned
By Geometry
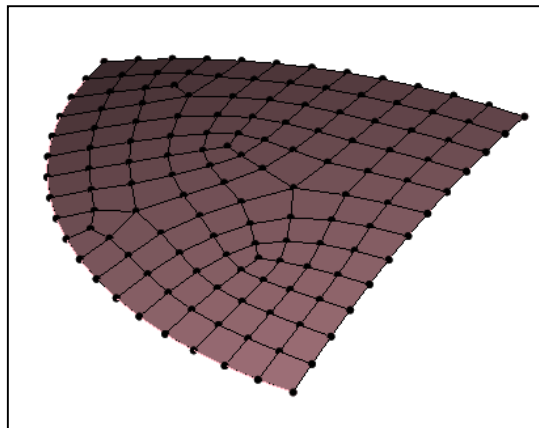
Traditionally this is the
only way mesh could
exist in CUBIT.

Steve Owen
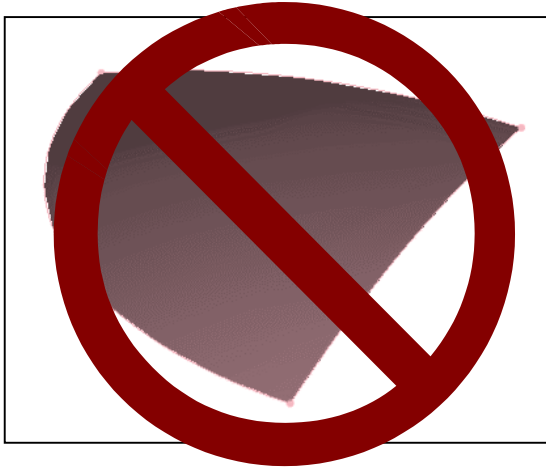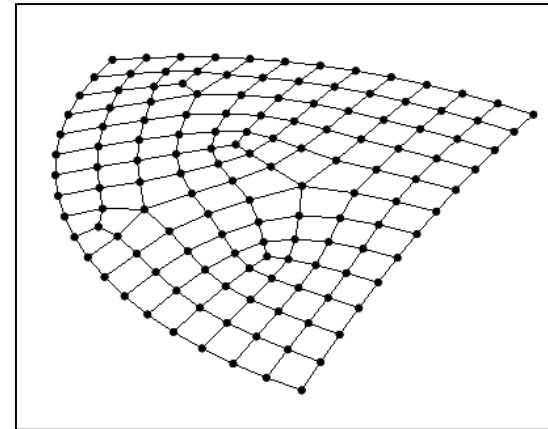
Free Mesh
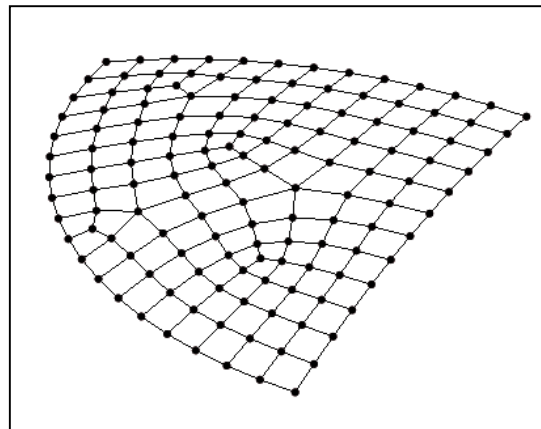
Geometry

Mesh

Mesh Not Owned By
A Geometric Owner
("Free Mesh")

Now mesh can exist and
be manipulated without a
geometric owner.

LOCKHEED MARTIN

Steve Owen

Sandia
National
Laboratories

Free Mesh Features

- **Can pull meshes in and out of association with geometry**
- **Can build geometry elements from an imported free mesh**
  - Can "snap" to target
- **Can refine, smooth, and add to free mesh, just as with associated mesh**

- **Can use scalar field on free mesh to guide sizing of new mesh on an existing geometry element**

- **Version 12.1 includes free mesh elements in "create" section of GUI**

LOCKHEED MARTIN
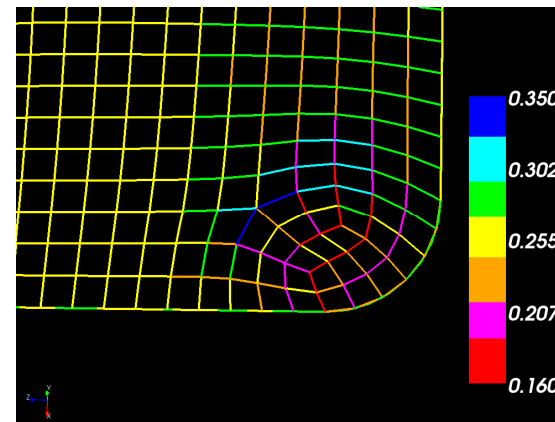
Steve Owen

Sandia
National
Laboratories

Adaptive sizing
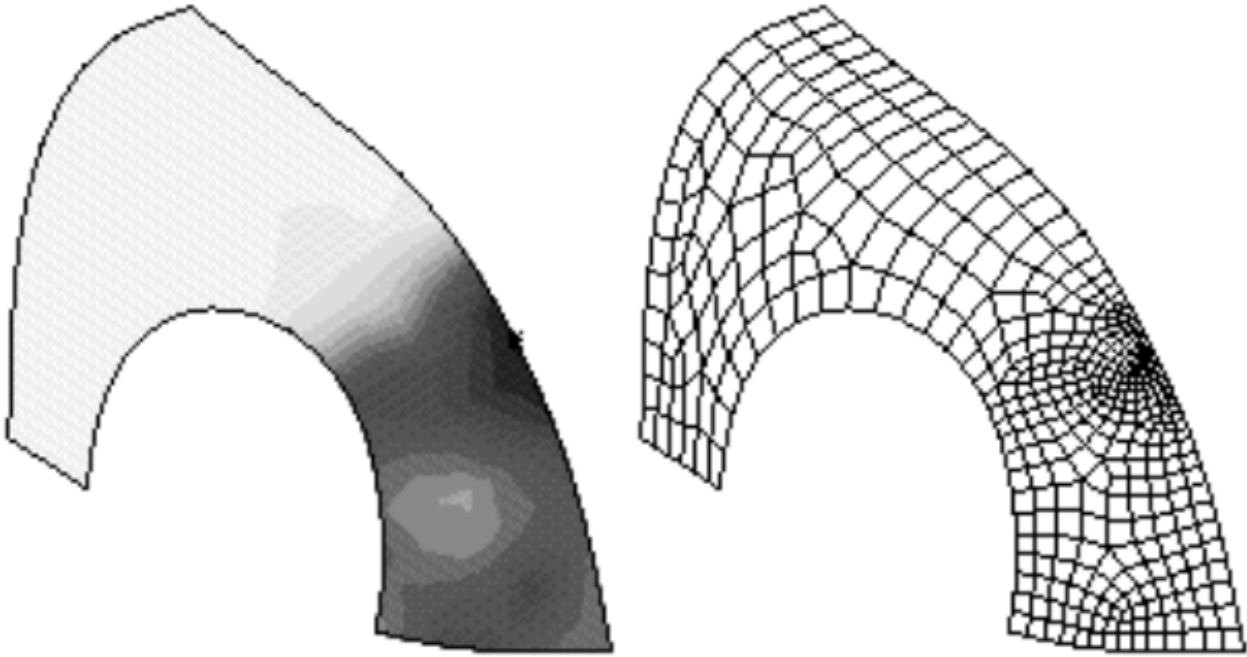
Figure 1. Plastic strain metric and the adaptively generated mesh

Edge Length Smoother/Quality

Steve Owen
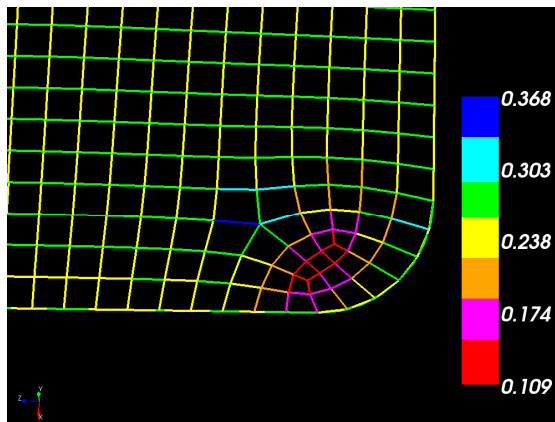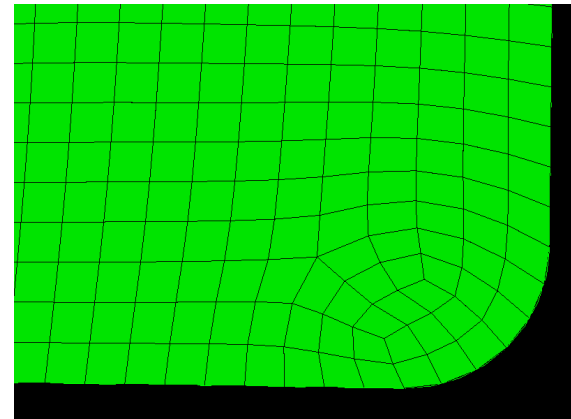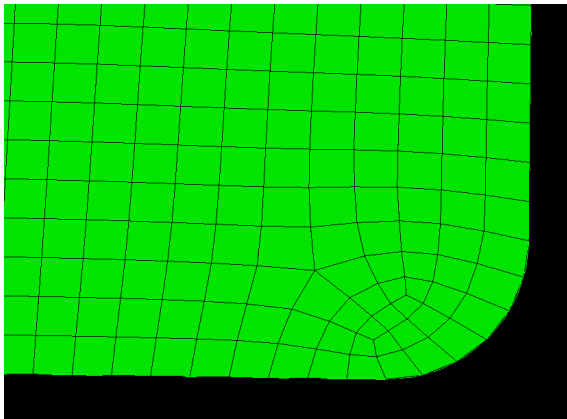
Mesh Pillowing

Improves mesh quality while preserving outer boundary
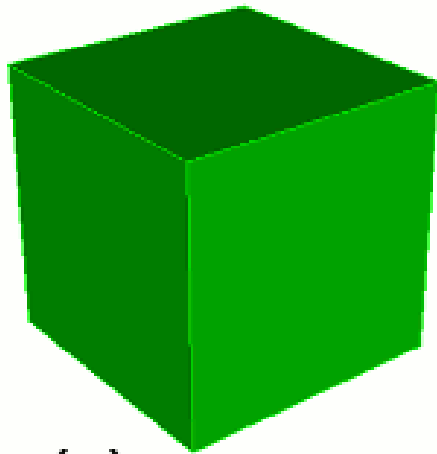
(a)   (b)   (c)
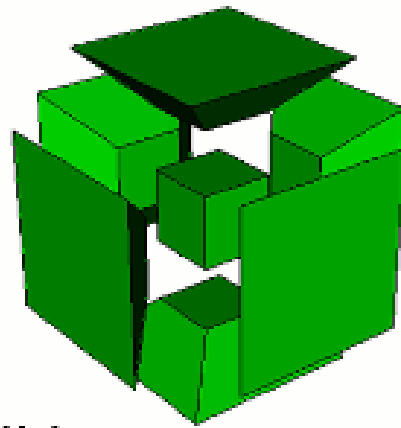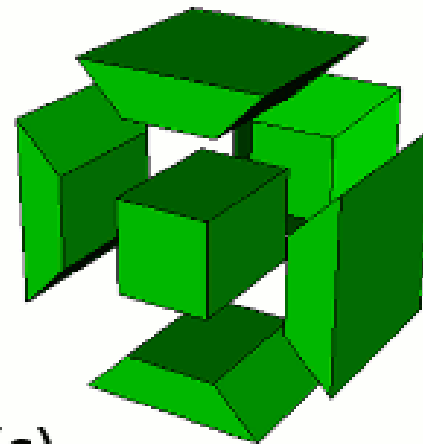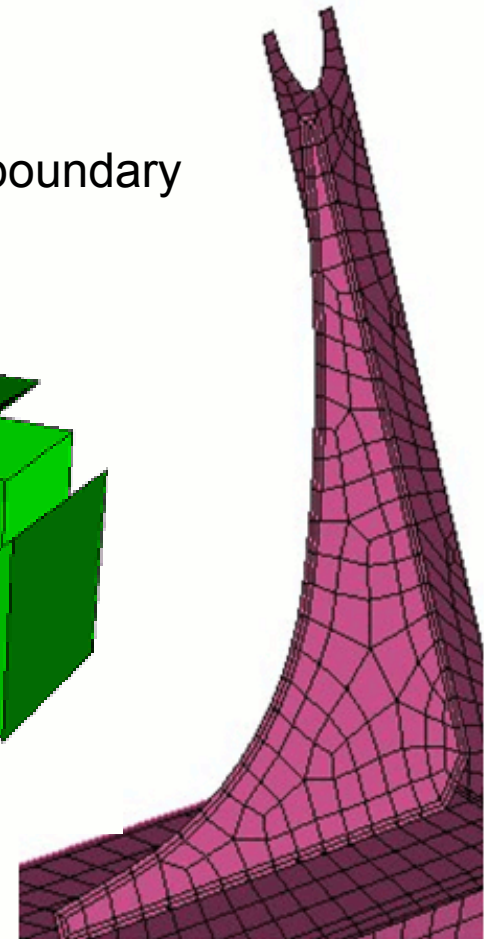
Steve Owen

Geometry

- Small feature detection

- Proximity detection (command line)

- More general plane definitions in webcut

Small feature detection

Feature Size: 0.0707

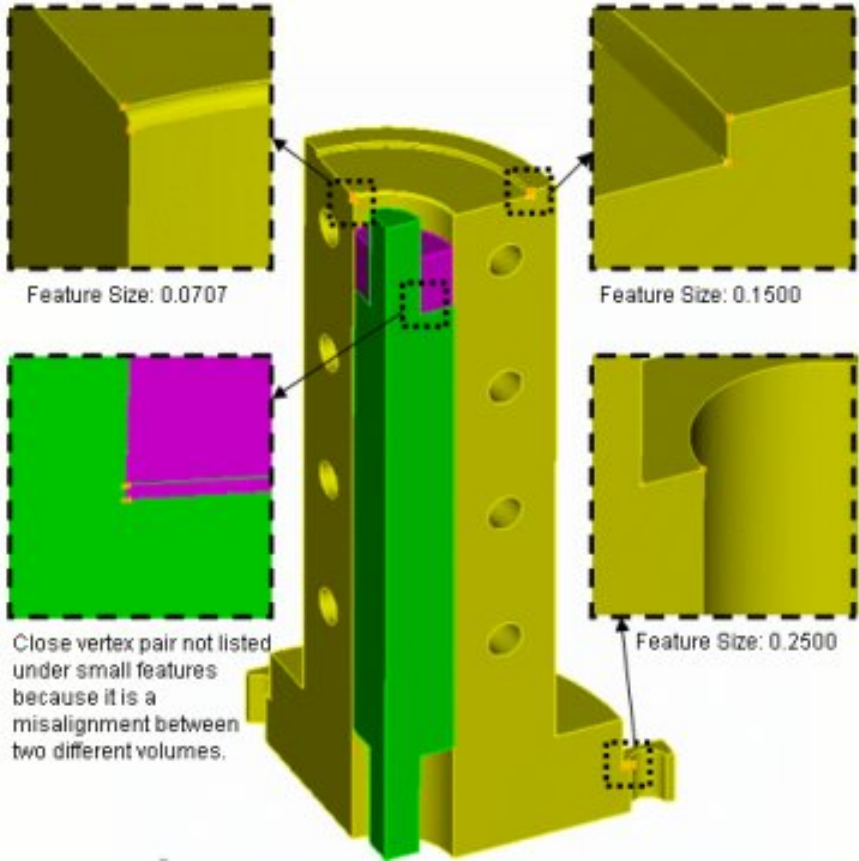Feature Size: 0.1500

Close vertex pair not listed under small features because it is a misalignment between two different volumes.

Feature Size: 0.2500

Steve Owen

General

- Interactive clipping plane

- Webcut preview

- Boundary condition types

- Material properties

Steve Owen

Steve Owen

LOCKHEED MARTIN

Sandia National Laboratories