

*Simulation Modeling Sciences*

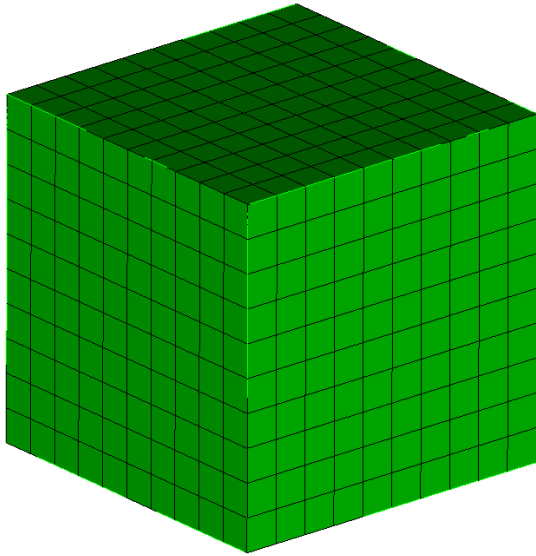
**Geometry and  
Mesh Generation Toolkit**

**CUBIT Fast-Start Tutorial**

# **18. Local Mesh Modification**

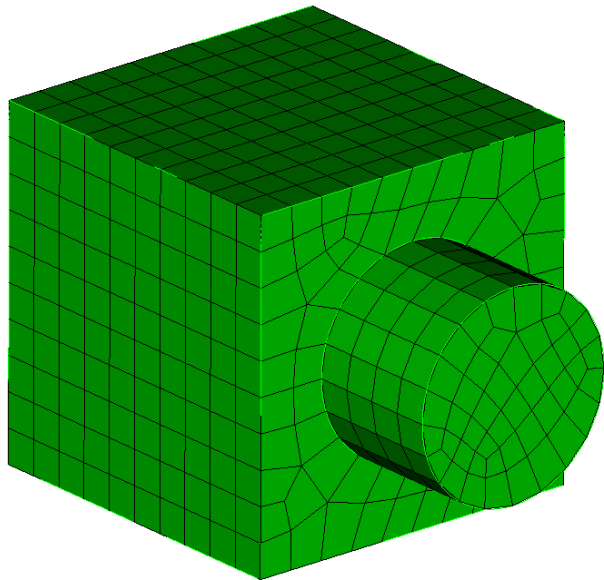
# Example 1: Single Volume Modifications

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Initial geometry and mesh:

```
brick x 10  
mesh vol 1
```



Geometry modification requires remeshing:

```
delete mesh  
cylinder radius 3 height 4  
vol 2 move 0 0 7  
unite vol 1 2  
reset vol 1 (to remove corrupt mesh settings)  
mesh vol 1
```



# Example 1 Notes

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- **In general it is not good to do geometry modifications when mesh is present—thus, delete mesh first.**
- **Mesh settings (size, interval counts, schemes, ...) from meshing geometry previously will often be affected by modifying the geometry and as a result become corrupt—thus, the “reset volume” command in the previous example.**

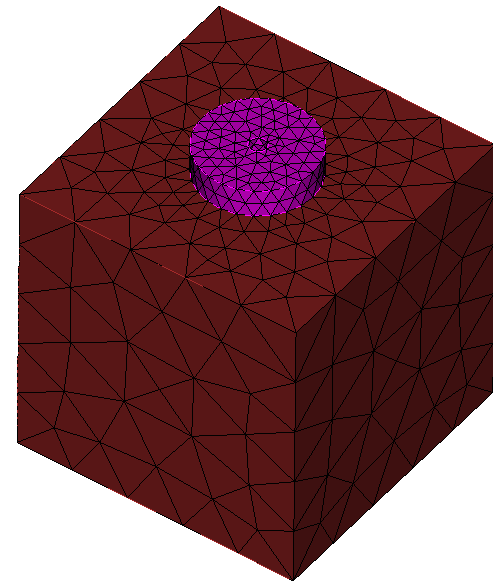
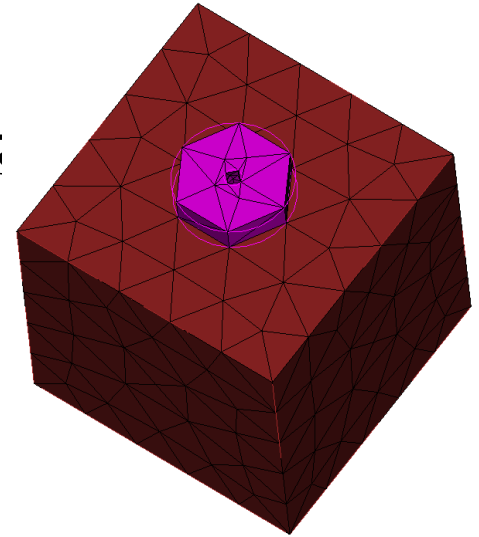
# Example 2: Mesh Re-sizing

Fix the size on the small hole:

```
reset
open "example2_coarse_mesh.cub"
delete mesh vol 3 prop
curve 46 45 interval default #remove hard setting
curve 46 45 size 0.3
mesh vol 3
```

Fix the size on the bolt head to be a little bit finer:

```
draw surf is_merged
draw curve all add
unmerge vol 3
delete mesh vol 3 prop
draw vol 3
draw vol 7
delete mesh curve 24 37 23
vol 3 size 0.5
mesh vol 3
merge all
mesh vol 7
```





# Example 2 Notes

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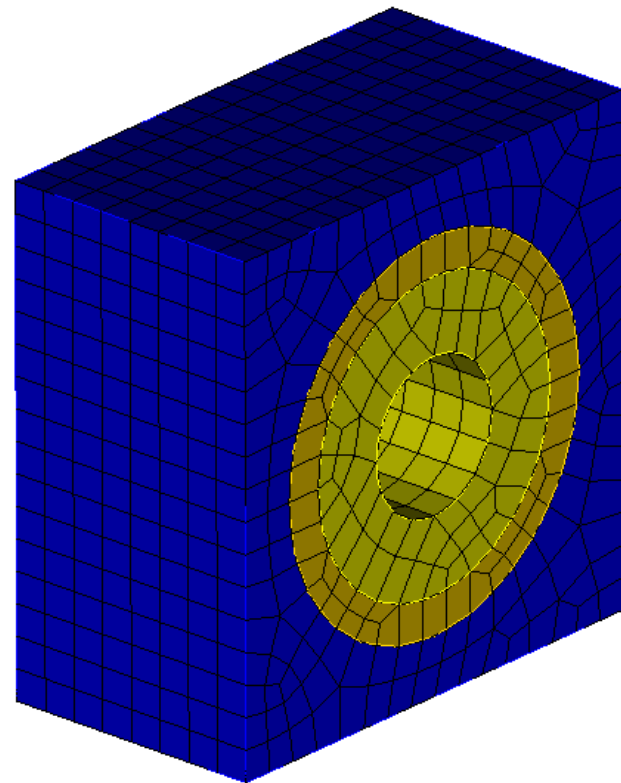
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- **Local tet remeshing is much easier than local hex remeshing**
- **When remeshing is localized to entities that are not merged typically only a single volume must be remeshed (first part of exercise)**
- **To get the desired size on the bolt it was necessary to unmerge the bolt from the block and mesh it independently first**
- **Deleting the mesh on curves of the block also forced deleting of mesh on higher order entities (surfaces and volume)**

# Example 3: Grouping Neighbors

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```
reset
open "example3.cub"
group "adj_vols" add vol in surf in vol 2
draw adj_vols
disp
unmerge vol 2
delete mesh vol 2 prop
cylinder radius 2 height 10
sub 11 from 2
reset vol 2
merge adj_vols
mesh vol 2
```





# Example 3 Notes

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- **Extended parsing using the “surf in vol...” syntax makes it easy to group neighbors that share either surfaces, curves, or vertices with the volume being modified**
- **When modifying hex meshes you will generally want to remerge before meshing to inherit existing meshes from neighbors**