Crustal Deformation Modeling Tutorial
Meshing Strategies

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Meshing Complex Geometry

Steps in creating a mesh

- Determine geometric features needed
  - Fault geometry
  - Topography
  - Sharp structural boundaries
  - Magma sources with complex geometry
- Create spline curve (2D) or NURBS surface (3D) in CUBIT
- If using surface in several models export it for future use
- Use surfaces within CUBIT to webcut volumes
- Choose discretization according to type of problem
Example problems

2D and 3D meshing of nonplanar geometry and variable discretization

- Two-dimensional subduction zone example using curves
  src/pylith/examples/2d/subduction
  - Top of slab
  - Bottom of slab
  - Topography/bathymetry

- Three-dimensional subduction zone example using NURBS surfaces
  src/pylith/examples/meshing/surface_nurbs/subduction
  - Subduction interface geometry
  - Splay fault geometry
  - Topography/bathymetry

- How to use CUBIT’s sizing function to vary discretization size
  src/pylith/examples/meshing/cubit_cellsze
2D Subduction Zone
Mesh with subduction thrust, slab bottom, and topo/bathymetry

Coseismic region

Continental crust

Oceanic crust

Continental mantle

Oceanic mantle
3D Subduction Zone
Mesh with subduction thrust, splay fault, and topo/bathymetry

Subduction thrust
Splay fault
Using user-defined fields to control mesh size

Example 1: Use a spatial database to control cell size
Using user-defined fields to control mesh size

Example 2: Use an analytical function to control cell size