

Mesh Generation & ADCIRC Parameter Specification

Map Module Mesh Module

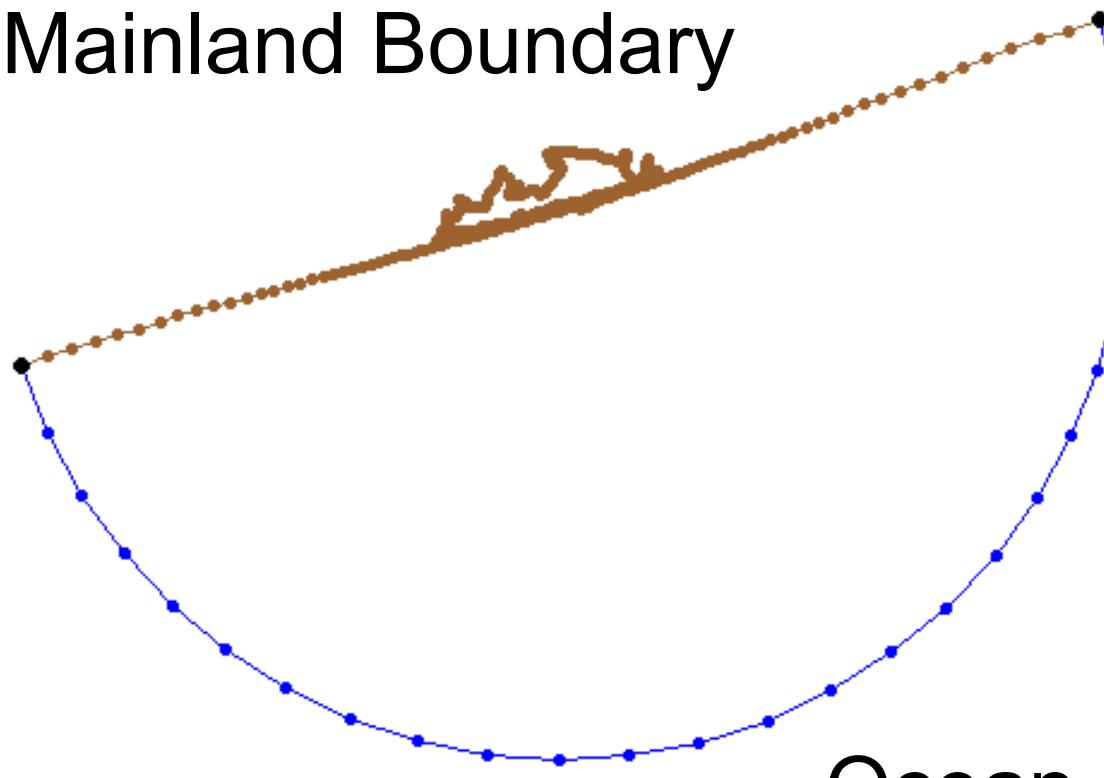
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ADCIRC Boundary Conditions



Mainland Boundary

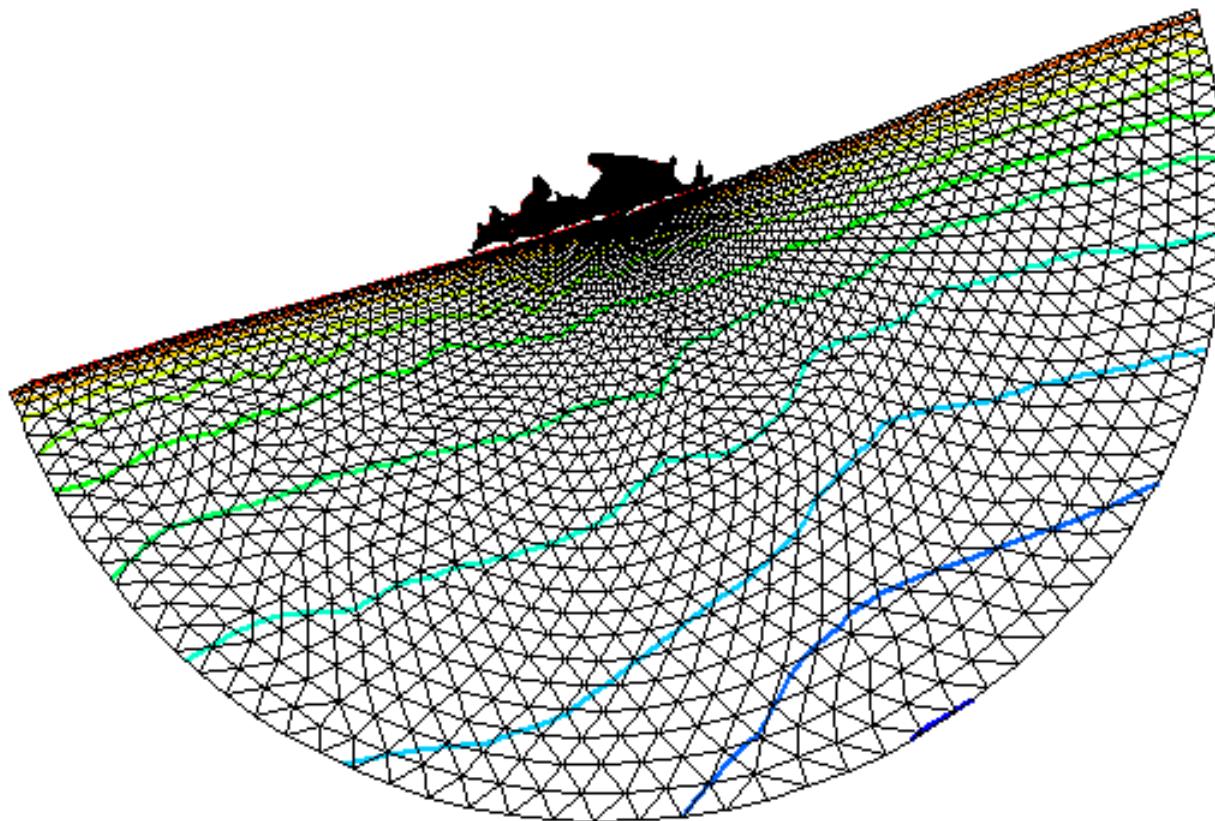


Ocean
Boundary



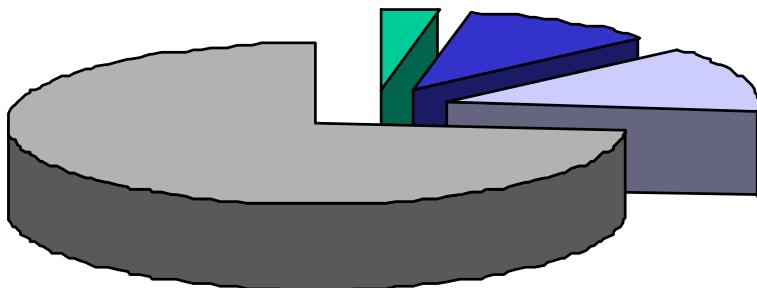


ADCIRC Mesh



Importance of Geometry

- Requires Largest Investment of Time
- Causes of Numerical Instability or Failure to Calibrate

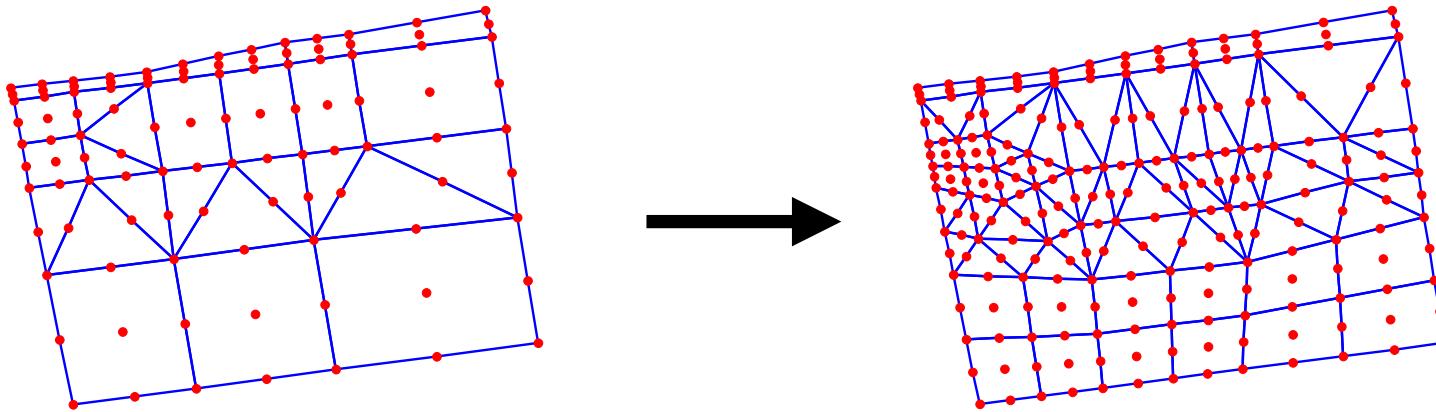


- Other
- Roughness
- Kinematic Viscosity
- Geometry & Design



Why Do We Need Mesh Editing?

- Geometry Is Key - Hard to Get Right without Revision
- Automated Methods Miss Hydraulic Subtleties
- Geometry Changes Over Time



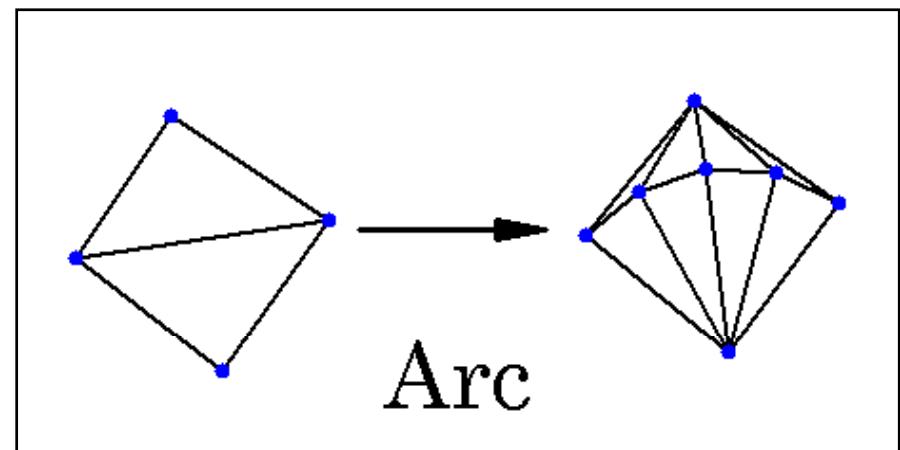
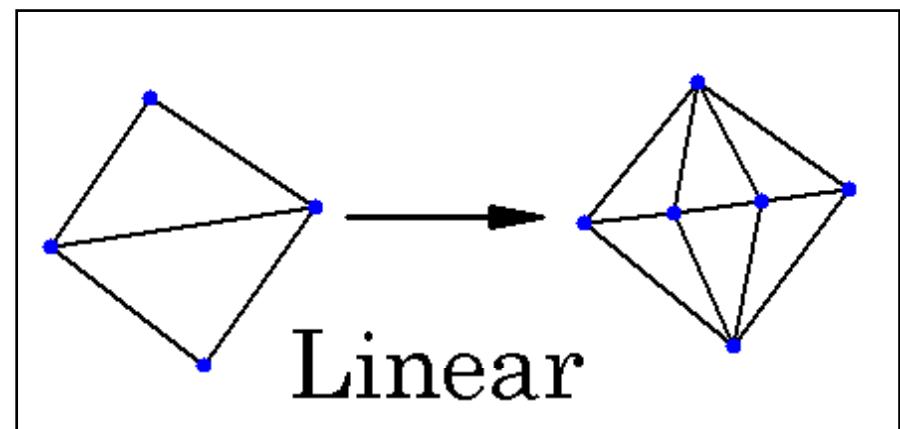
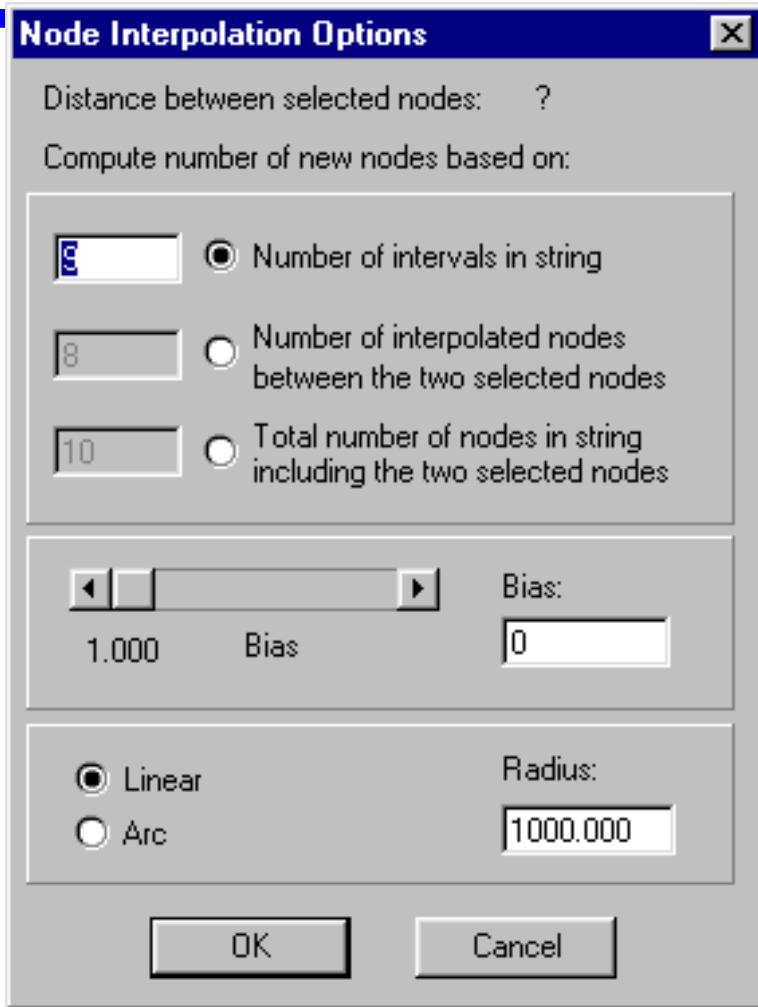


Mesh Editing Tools

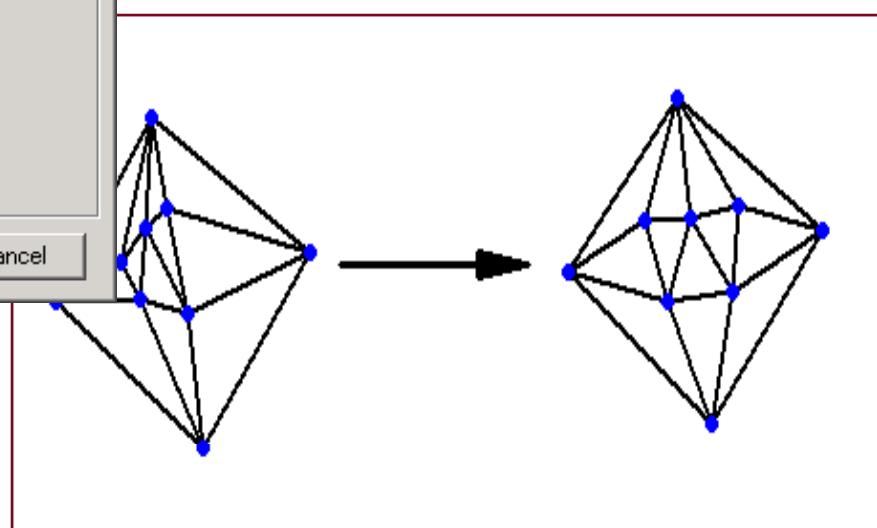
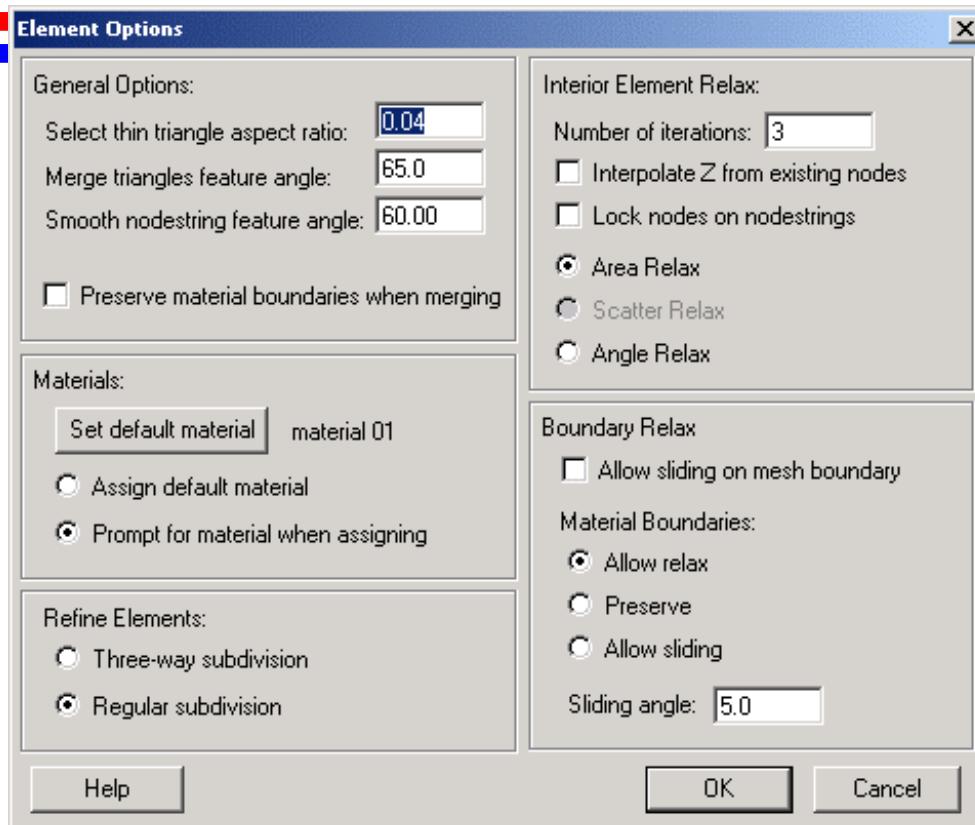
- Nodes
 - – Select
 - – Create – Node Insertion, Node Interpolation, Refinement, Relaxation
 - Options
- Elements
 - – Select
 - – Create
 - Options
 - – Edge Swap
- Selection
 - Shift Key – toggles selection state (multiselect)
 - Drag box to select all nodes/elements in box
 - Control Key + Drag arrow to select all elements intersecting line
 - Selection options in Edit Menu



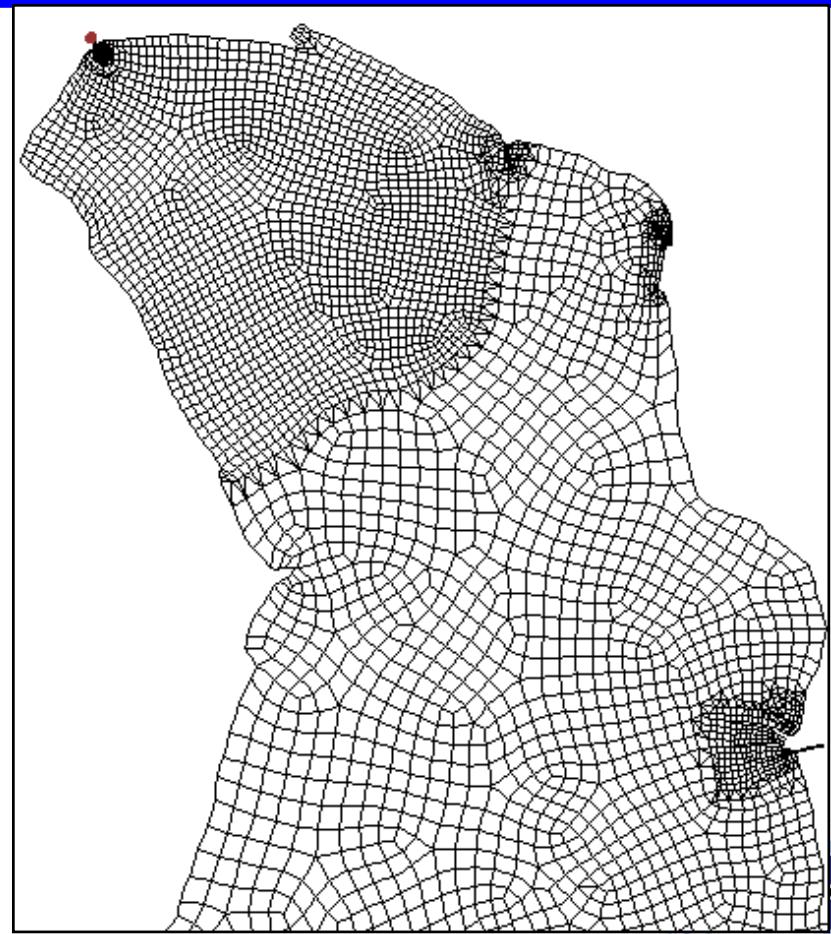
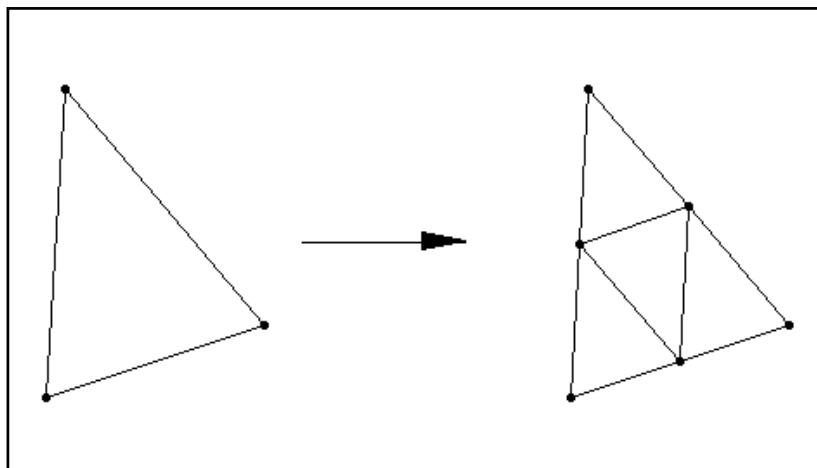
Node Interpolation and Insertion



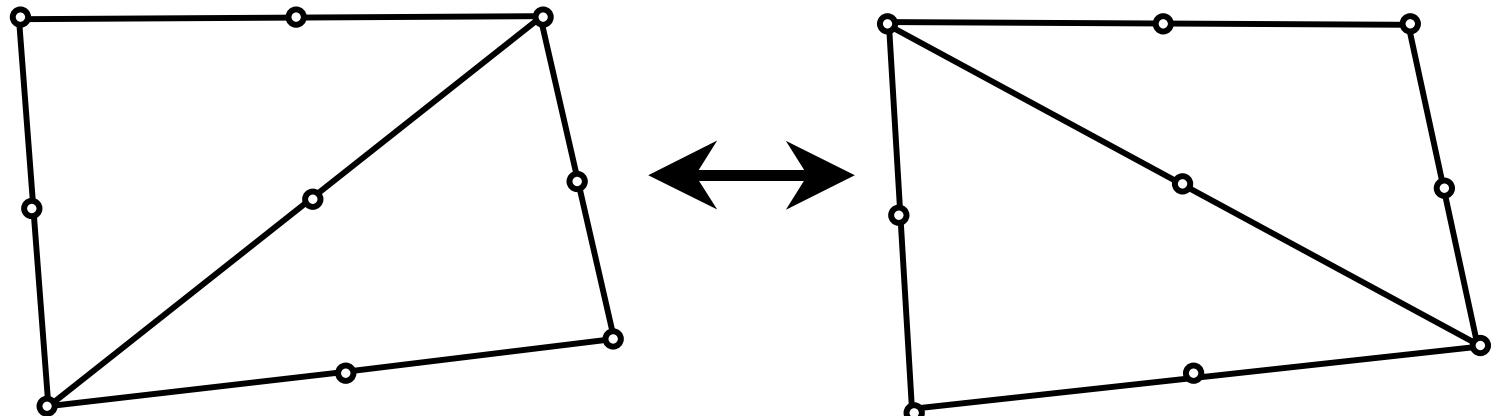
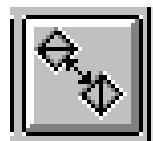
Element Options - Relaxation



Mesh Refinement



Swap Edges





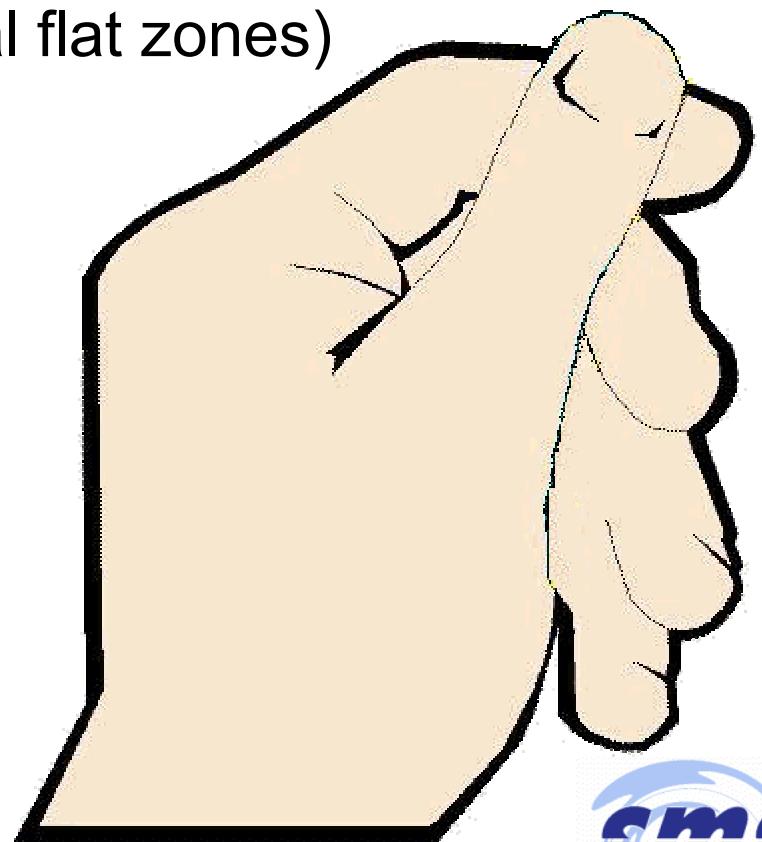
Editing Bathymetry

- Minor Editing of Bathymetry can Help with Model Stability
- Major Changes Should Not be Made Unless Scattered Data was Wrong

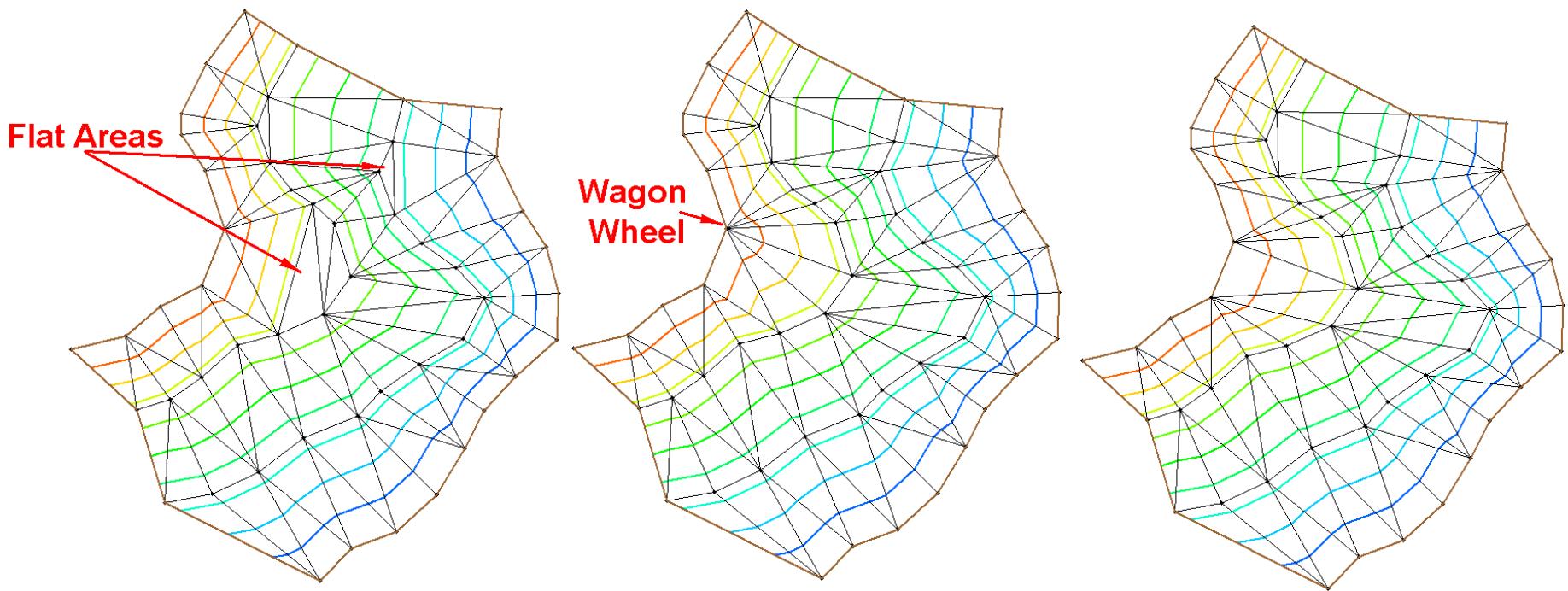


Mesh Guidelines

- Accurate Contours (no artificial flat zones)
- Smooth Boundaries
- Size Transition
- Element Density

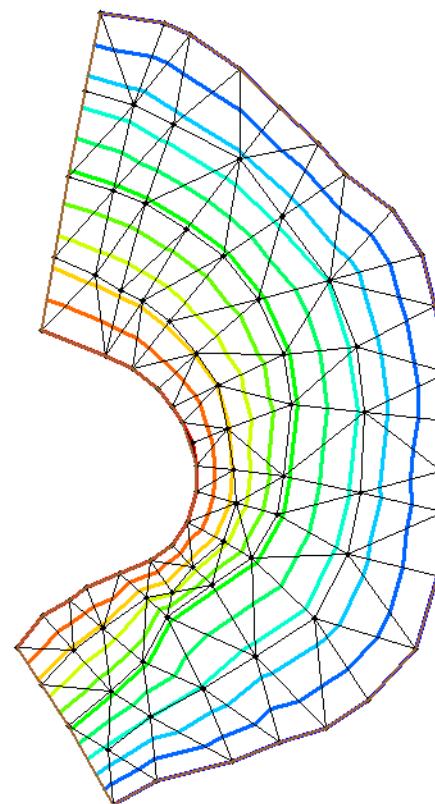
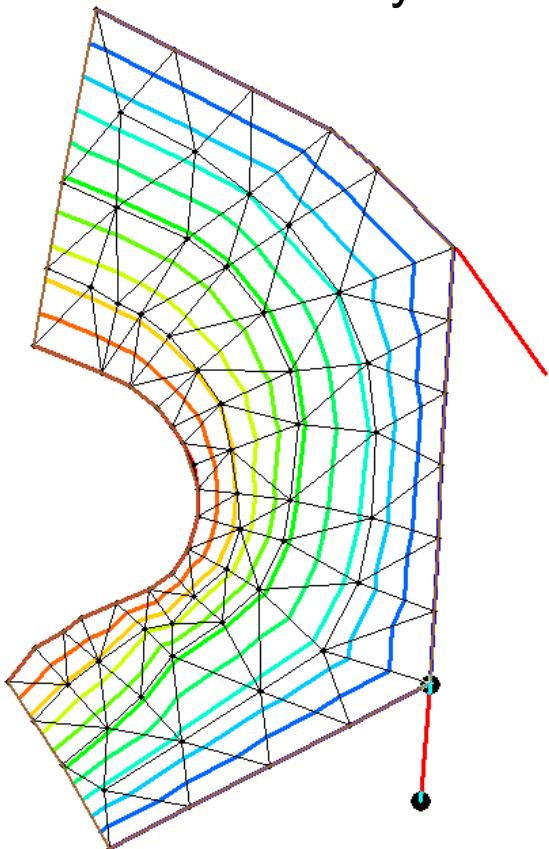


Swap - Smooth Contours

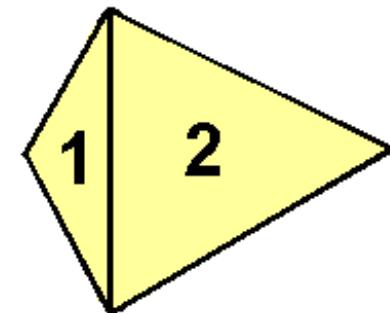
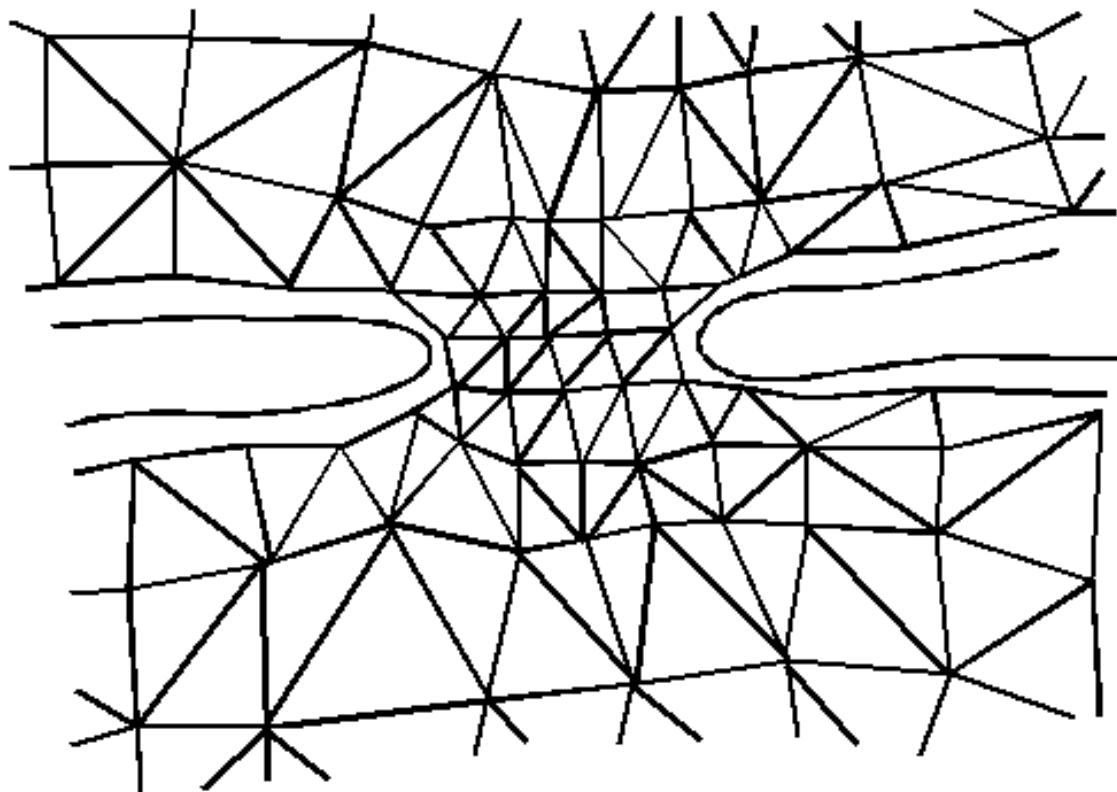


Smooth Boundaries

- Element edges on contours
- Minimize boundary break angles ($< 10^\circ$)



Size Transition



$$\frac{1}{2} \leq \frac{A_1}{A_2} \leq 2$$

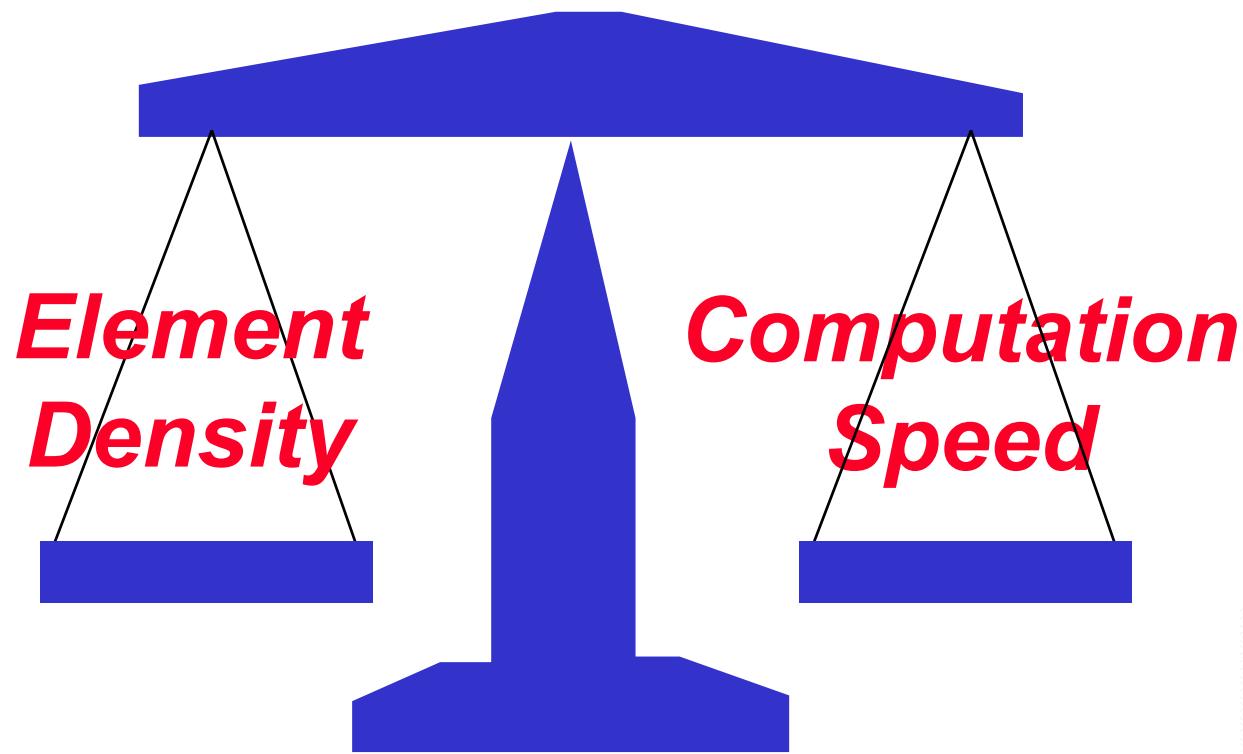
A_1 = Area of Element 1

A_2 = Area of Element 2



Element Density

- How Many Elements Should My Model Have???

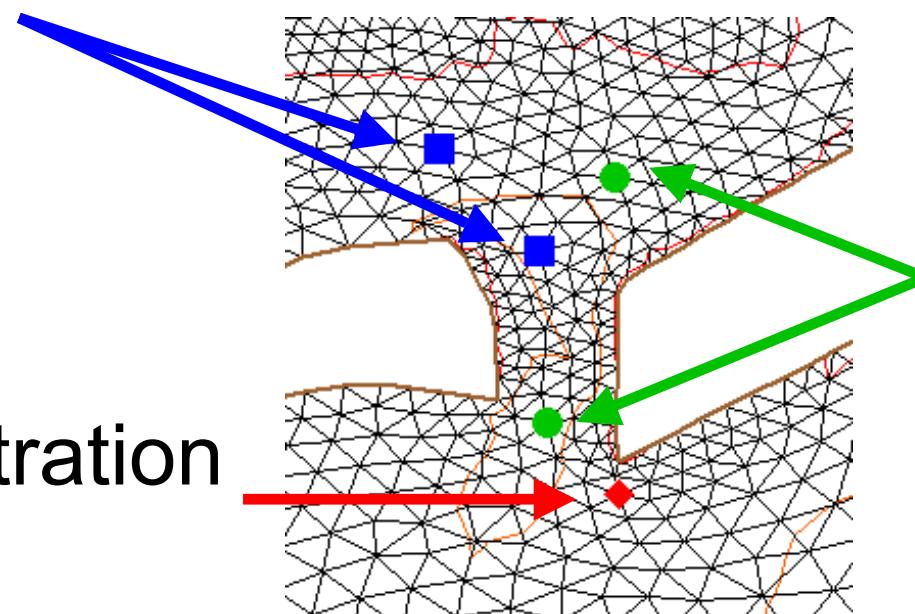




ADCIRC Recording Stations

Elevation Station

Concentration
Station



Velocity
Stations





ADCIRC Model Control

- Wetting/Drying
- Cold\Hot Start
- Coriolis

Model Control

| | | | |
|---|--|--|--|
| Project Title: <input type="text" value="ADCIRC Model"/> | Run ID: <input type="text" value="ADCIRC Run"/> | Station Output | Bottom Friction |
| <input checked="" type="checkbox"/> Non Fatal Error Override | Model Type | Global Output | Tidal Forces |
| <input checked="" type="checkbox"/> Abbreviated Output | <input checked="" type="radio"/> 2D DI <input type="checkbox"/> Transport | Wind | Harmonic Analysis |
| <input checked="" type="checkbox"/> Echo Screen | <input type="radio"/> 3D VS <input type="radio"/> 3D DSS | Time Control | Solver |
| Initial Values | <input checked="" type="checkbox"/> Finite Amplitude Terms On <input checked="" type="checkbox"/> Wetting/Drying Options... <input checked="" type="checkbox"/> Advection Terms On <input checked="" type="checkbox"/> Time Derivative Terms On | Hot Start Output | |
| <input checked="" type="radio"/> Cold Start <input type="radio"/> Hot Start 1 (unit 67) <input type="radio"/> Hot Start 2 (unit 68) | | <input type="checkbox"/> Generate Output File # Time Steps: <input type="text" value="0"/> | |
| Coordinate System | Generalized Wave Continuity: <input type="text" value="0.0010"/> Lateral Viscosity: <input type="text" value="3.000"/> L^2/T Gravity: <input type="text" value="9.81000"/> | Coriolis Option | |
| | Lateral Diffusivity: <input type="text" value="0.000"/> | <input type="radio"/> Constant <input type="text" value="0.00010"/> <input checked="" type="radio"/> Variable | Model Center |
| | Minimum Angle For Tangential Flow: <input type="text" value="90"/> deg. | Latitude: <input type="text" value="40.670"/> deg. | Longitude: <input type="text" value="-72.430"/> deg. |
| | | <input type="button" value="Find Center"/> | |
| | | <input type="button" value="OK"/> | <input type="button" value="Cancel"/> |





ADCIRC Time Control

- Model Run Time
- Recording Stations Start/Stop Time
- Global Constituent Start/Stop Time

Time Control

| | | |
|---|--|--|
| Simulation Time Control | Start Day: <input type="text" value="0.000"/> | Constituent |
| Ramp Function Value: <input type="text" value="0.000"/> | days | Global Elevation |
| Reference Time: <input type="text" value="0.000"/> | days | Start Day: <input type="text" value="0.000"/> |
| Wave Equation Time Weighting Factors: | <input type="text" value="0.350"/> <input type="text" value="0.300"/> <input type="text" value="0.350"/> | Specify: <input checked="" type="radio"/> Run Time (days) <input type="radio"/> End Time (days) |
| | | Output Every <input type="text" value="24"/> Time Steps |
| | | End Day: <input type="text" value="0.100"/> |

0.0

0.1

Time Control

Harmonic Analysis

Recording Station Elevation

Recording Station Velocity

Recording Station Concentration

Global Elevation

Global Velocity

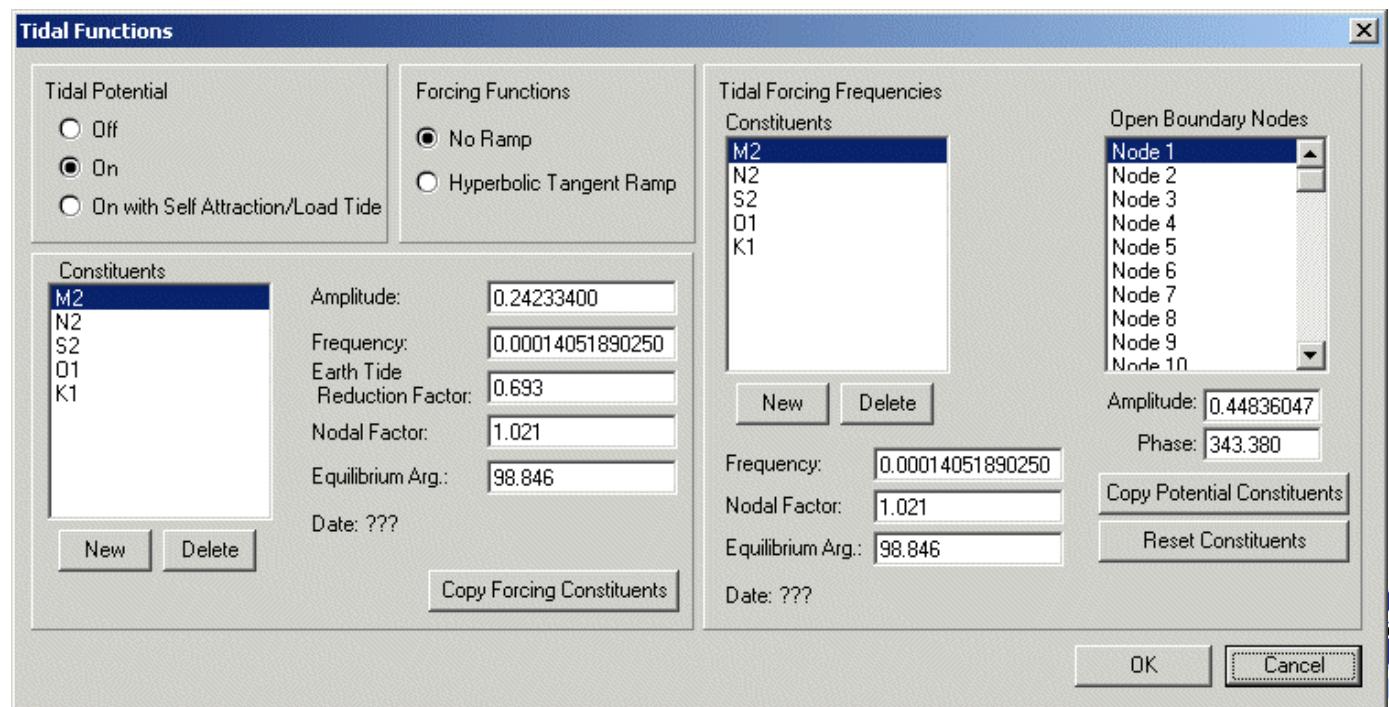
Global Concentration

Global Wind Stress

OK Cancel

ADCIRC Tidal Forces

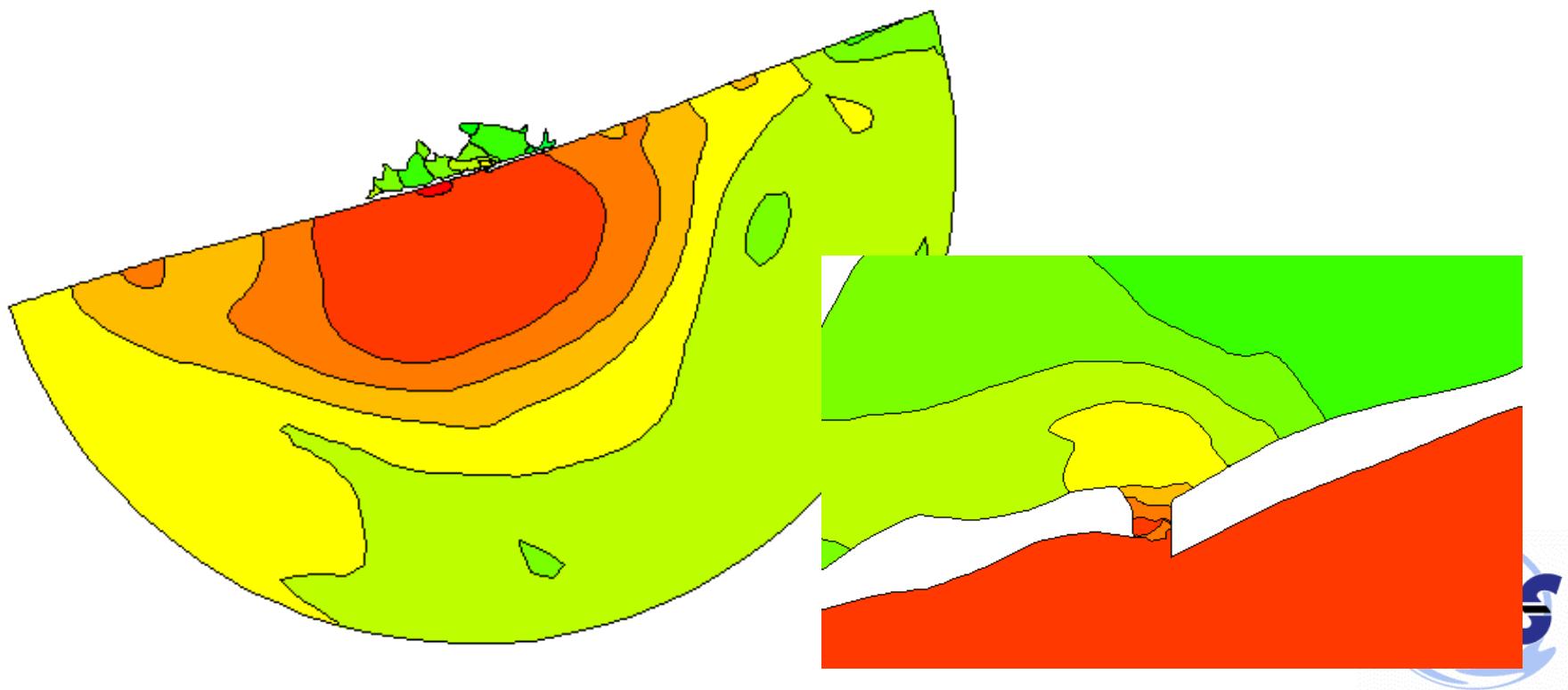
- Tidal Potential
- Tidal Forcing





ADCIRC Solution

Unit 63 – Water Surface Elevation





ADCIRC Solution

Unit 64 – Velocity

