POINTWISE POINTER

A USER TIP FROM THE SUPPORT DESK
FALL 2003

Using Baffles in Unstructured Blocks

Baffle faces are a secondary face type available for unstructured block construction. Generally, unstructured block faces are completely closed or watertight. However, Gridgen allows you to save additional faces which are not closed. Baffle faces can be connected to closed faces or they can be physically separate from closed faces. As with closed unstructured block faces, baffle faces can be created from both structured and unstructured domains. There are two reasons to use baffle faces in your unstructured blocks: to provide a wall boundary on the interior of an analysis volume, and to provide additional clustering control on the interior of your block.

When building an unstructured block, Gridgen does not provide the **Save the Face** button until you have constructed a closed group of domains, but the **Save As Baffle Face** button is available as soon as a single domain is selected.

As an example, shown in Figure 1, the pierced elbow tutorial grid has been modified so there is now an additional triangular shaped domain on the interior. This grid already contains one block, so it can be modified using **Modify** in the *BLOCK COMMANDS* menu to add the new baffle face. Once in the *MODIFY BLOCKS* menu, choose **Add 2nd Face**. Now pick the new domain. **Save As Baffle Face** is now available in the *ASSEMBLE 2ND FACE* menu as shown in Figure 2. The triangular domain is also highlighted in a bold yellow color as shown in Figure 3.

Press **Save As Baffle Face** and save the block. Adding the new face caused the original block interior to be cleared, so the volume will have to be initialized again using **Run Solver Unstrctrd**. Using block **Examine** after initializing the volume will illustrate the differences on the interior with and without the baffle face. The average cell edge size on the baffle is 1.0 while the remainder of the mesh has an average cell edge of about 3.0. Figure 4 shown on the reverse illustrates the before and after differences in local clustering for the pierced elbow grid.

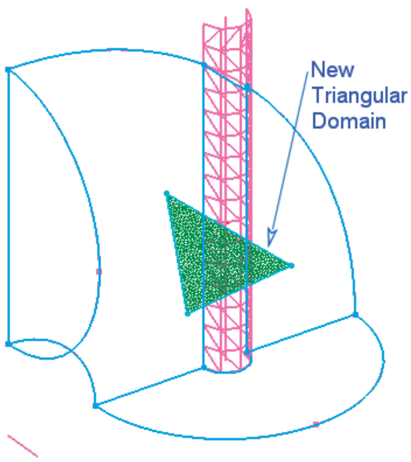

Figure 1

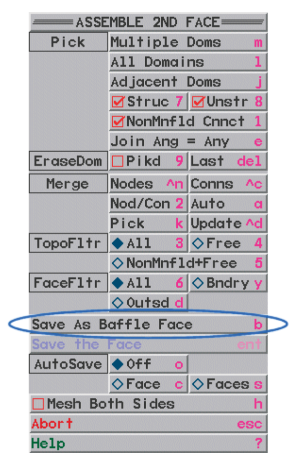

Figure 2

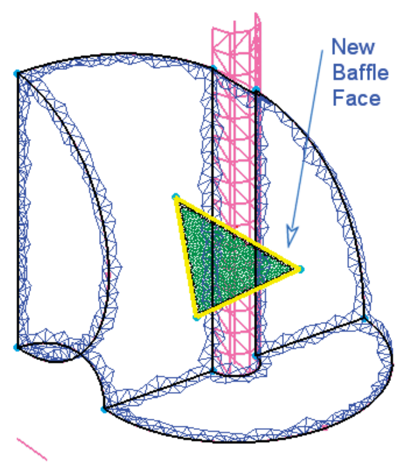

Figure 3

Gridgen
Reliable CFD Meshing

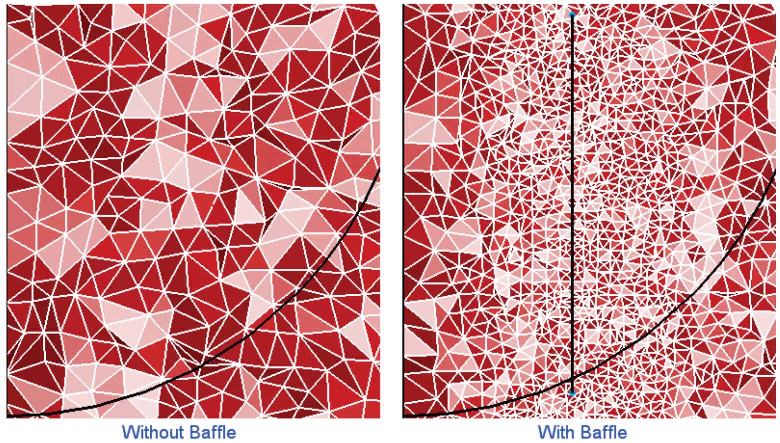

Figure 4

Proceeding to the *ANALYSIS S/W COMMANDS* menu and using **Set BCs**, you can see that Gridgen has set both sides of the baffle face to Type 1, or point-to-point interface. The SELECT DOMAINS FOR BC browser is shown in Figure 5 with both baffle sides selected. If you planned to treat this as a true wall baffle, you would select these two entries in the browser and set them to the equivalent wall boundary condition for your selected solver (for this example, the **generic 3D** solver is selected). Or leave the interfaces as is, and the domain becomes part of the mesh interior and is invisible when exported to your flow solver. For a good example of creating a grid with baffles, try the "Mixer: Using Baffles" tutorial in the tutorial workbook.

Using baffle faces in this way for clustering control has many applications. For instance, a baffle face could be used to add clustering where a shock is expected in your solution or to easily add mesh clustering in the wake region downstream of a wing or other control surface. You can add as many baffle faces to a block as you need and their shape is only limited by your imagination. Try a similar modification to the pierced elbow grid as described above for practice. Begin using baffles for more control in your unstructured or hybrid grids soon.

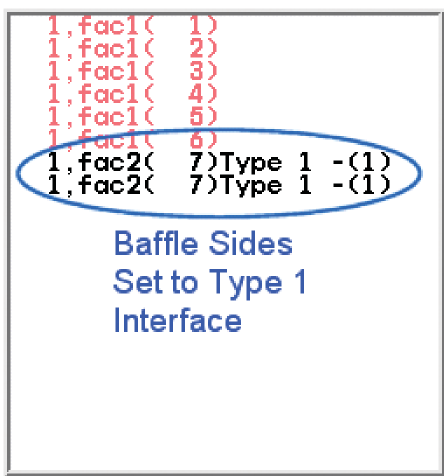

Figure 5

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