Altair

HyperWorks

HM-3560: Basics of Domains and Handles

Model Files

This exercise uses the `morphing_1.hm` file, which can be found in the `hm.zip` file. Copy the file(s) from this directory to your working directory.

Exercise: Using Domains and Handles

In this exercise you will create domains and handles, and morph the model.

Step 1: Load and review the model.

Open and review the HyperMesh model `morphing_1.hm`.

Step 2: Auto generate 2-D domains and handles.

1.   Click the **Morphing** menu in the menu bar and select **Create > Domains**.

2.   Change the create method to **auto functions**.

3.   Click **generate**.

     Based on the model's geometric features, all of the model's elements are organized into various domains and local handles are created and associated with the domains.

Step 3: Move elements into a new 2-D domain.

1.   Set the selector to **2D domains**. Toggle to the **elems** selector if not already there.

2.   Click ◄ to clear the elements that were already selected.

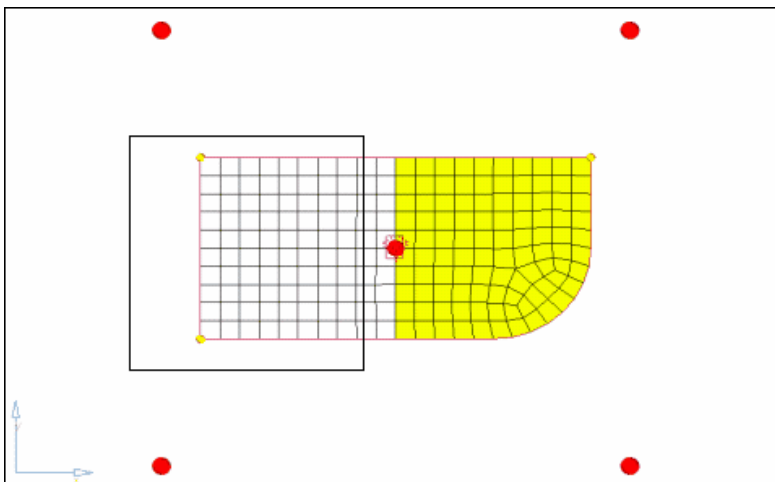3.   Using **elems >> by window**, select the elements indicated in figure 1.

Figure 1: Elements to select to move into a new domain

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4. Verify that **partition 2D domains** is active.

5. Click **create** to create the domain.

    Local handles are created for the new domain. You should now have two local domains. Elements can only belong to one domain at a time. Thus, the elements you selected were moved into the new domain. This functionality makes it very easy to group elements into different domains.

Step 4: Split the edge domain of the radius to have more control when morphing.

1. Click the **edit edges** subpanel in the **Morphing > Domains** panel.

2. Verify that the **split** option is selected.

3. With the **domain** selector active, select the edge domain of the part's radius as indicated in the Figure 2.

    The **node** selector automatically becomes active once the edge domain is selected. Click the **domain** selector to make it active and see that you selected the desired edge domain.
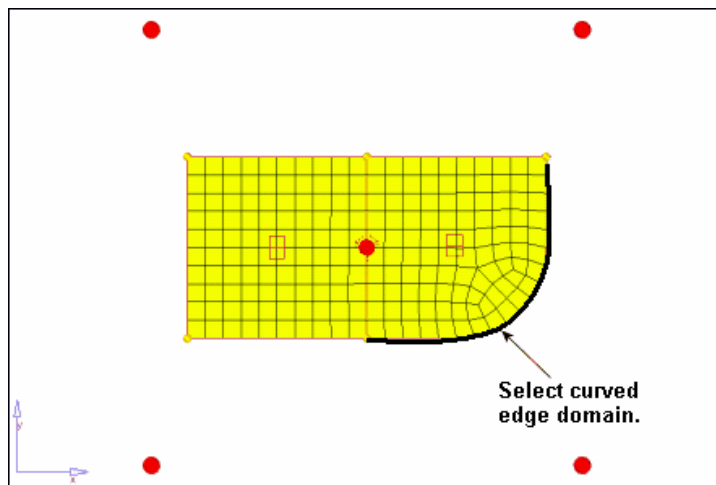

Figure 2: Edge domain to select

4. Click the **node** selector to make it active.

5. Select the node on the positive Y-axis end of the radius, as indicated in the image Figure 3.
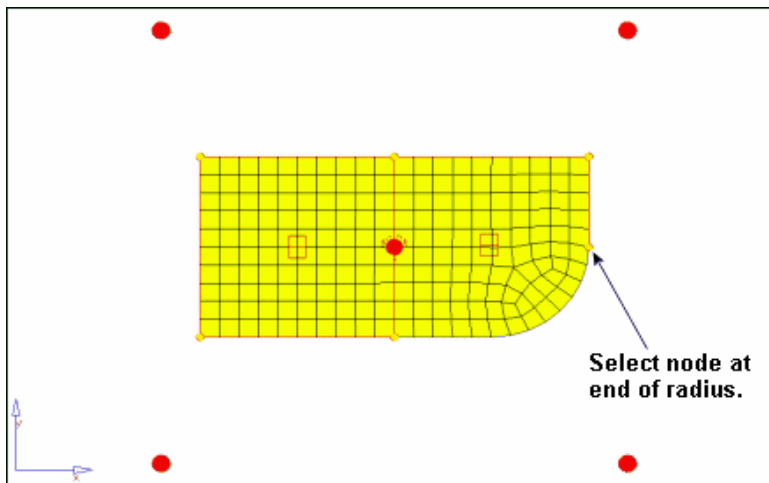

Figure 3: Node selection to split the edge domain of the radius

6. Click ***split*** to split the edge domain at the node.

7. Repeat the above process to further split the edge domain of the radius, this time at the node indicated in the Figure 4.
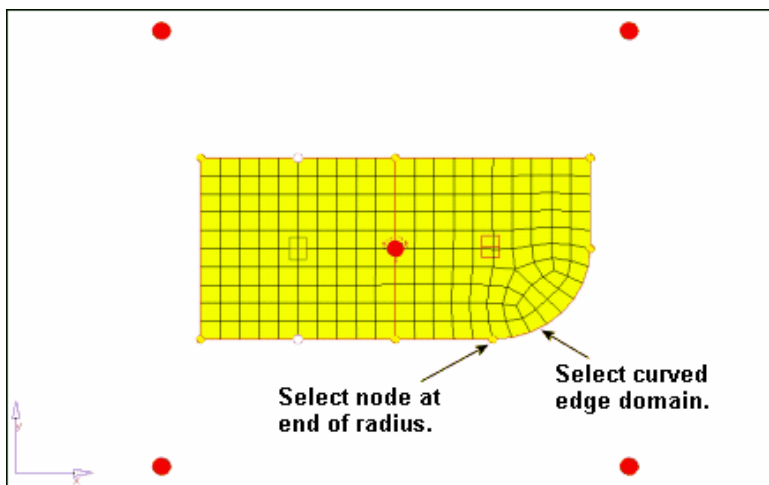

Figure 4: Node selection to further split the edge domain of the radius

8. When complete, click ***return*** to exit the panel.

Step 5: Add local handles to the 2-D domain on the part's left side.

1. Click the ***Morphing*** menu, and pick ***Create > Handles***.

2. For ***name=***, enter `local`.

3. Click the **attached to:** ***domain*** selector to make it active.

4. Select the 2-D domain on the part's left side by selecting its red icon, as indicated in the following image.
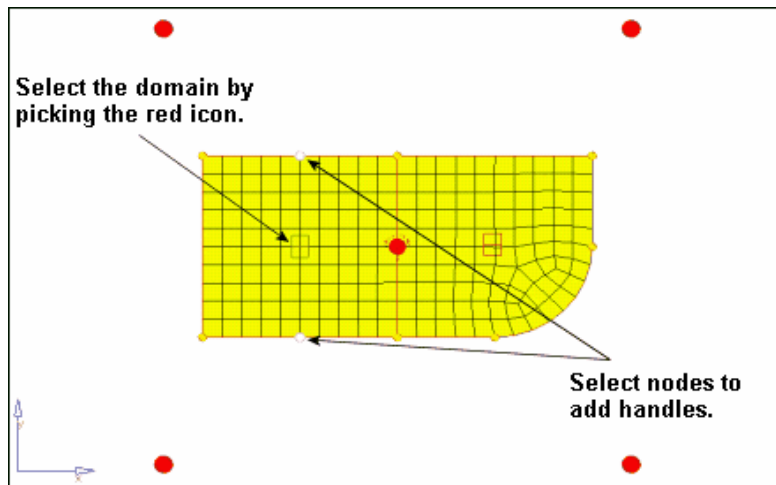

Figure 5: Adding handles to a 2-D domain

5. Click the **by nodes: *nodes*** selector to make it active.

6. Select the two nodes as indicated in the previous image.

7. Click ***create*** to create the handles and add them to the 2-D domain.

8. Click ***return*** to exit the panel.

Step 6: Perform basic morphing to understand how domains and handles interact with each other and the mesh.

1. Click the ***Morphing*** menu, and select ***Morph***.

2. Select the ***move handles*** subpanel if not already there.

3. Change the mode to ***interactive*** if not already set.

4. With the ***handles*** selector active, select the two handles on the right-hand end of the part, as indicated in figure 6.

    If you select one or more handle, those handles follow the handle you drag (in Step 6.10, following).

5. Switch from **manipulator** to ***on plane***.

6. Click the ***N1*** selector to make it active.

7. For ***N1***, ***N2***, and ***N3***, select any three nodes on the model to define a plane.

8. Click ***morph***.

    The message, "*pick handles and move to new location*" appears in the status bar.

9. Click on and drag one of the selected handles to morph the part.

   As you drag the handle, the mesh's size and shape is adjusted. Notice that the following occurs as the selected local handle is moved:

   - The handles selected in step 6.2 above follow the handle you are dragging.

   - All of the elements belonging to the selected local handle's 2-D domain are affected by moving that local handle.

   - The 2-D domain's non-selected local handles act like anchors (they do not move).

   - The nodes on the edge domains and between any two non-selected local domains do not move.

   - None of the elements in the other 2-D domain are affected.

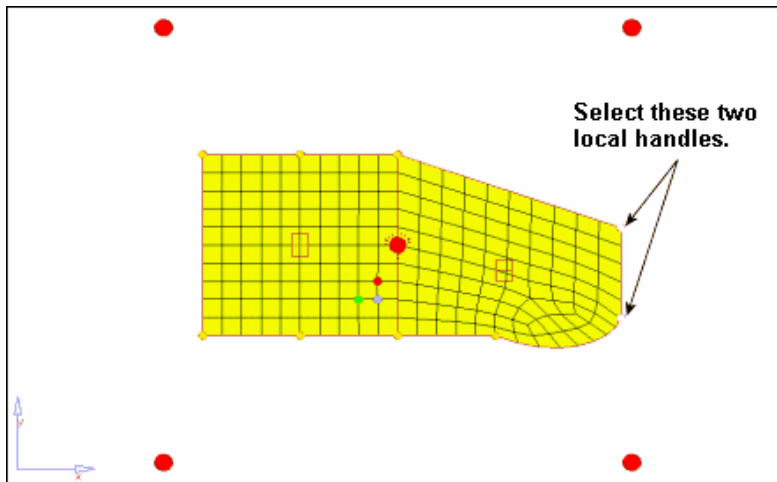10. Release the mouse button to complete the morphing operation.

Figure 6: Example result of morphing the model

11. Click *undo*.

    The **HyperMorph** module allows for multiple levels of undo and redo for all morphing operations. This functionality is available for any particular HyperMesh session and its current model as long as the session and its model remain open.

12. Click ⏮ to clear the selected handles.

13. With the *handles* selector active, select one or more global handles.

14. Click *morph*.

15. Click on and drag any global handle to morph the part.

Summary

The following occurs as the selected global handle is moved:

- The handles selected in Step 6.2 above follow the handle you are dragging.

- The non-selected global handles act like anchors (they do not move).

- All of the elements, local handles and edge domains are affected.