HM-3640: Interpolating Loads Using Shapes

Model Files

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

Exercise: Using Shapes to Interpolate Loads

Shapes are one of the most versatile types of the morphing entities. Loads can be converted into shapes and vice versa. When you position shapes, they act on a volume equivalent to the initial volume, but at the new location. In this regard, shapes can be used to interpolate loads on a mesh given the loading at the boundaries of a volume.

In this exercise you are given a temperature distribution at points defined by a cube (hexa element). You will use shapes to interpolate the temperatures to the tube lying inside the cube.
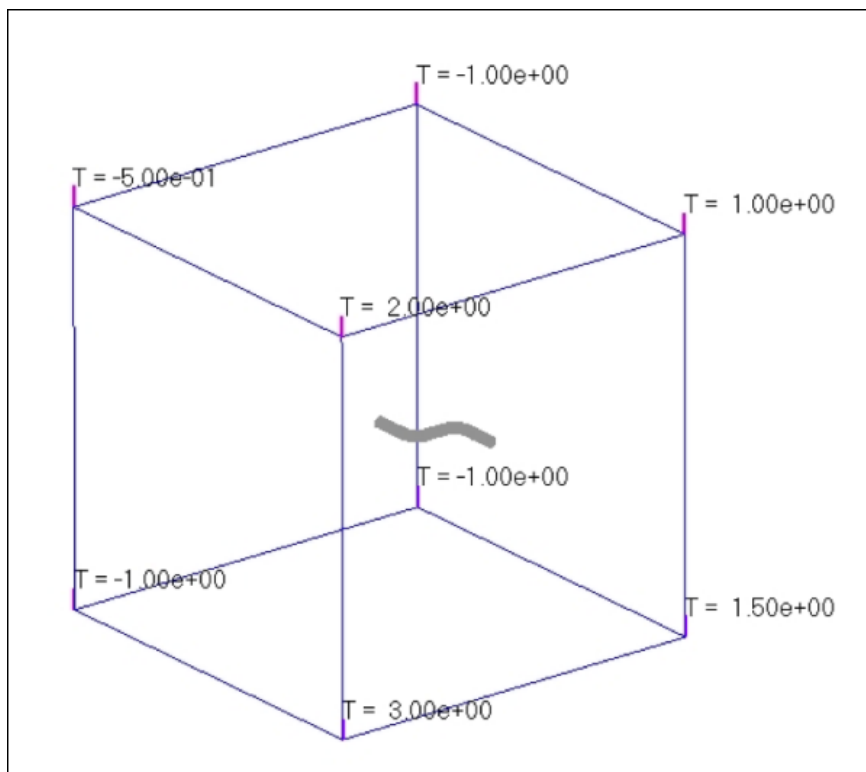

Figure 1: Model

Step 1: Load and review the model.

Open the HyperMesh file `s_bend_tube.hm`

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Step 2: Convert temperatures to shapes.

1. From the menu bar, select *Morphing* > *Create* > *Shapes*, then select the **Convert** subpanel.

2. Switch the conversion type to *temperature to shapes*.

3. For **loadcols**, select *temperature*.

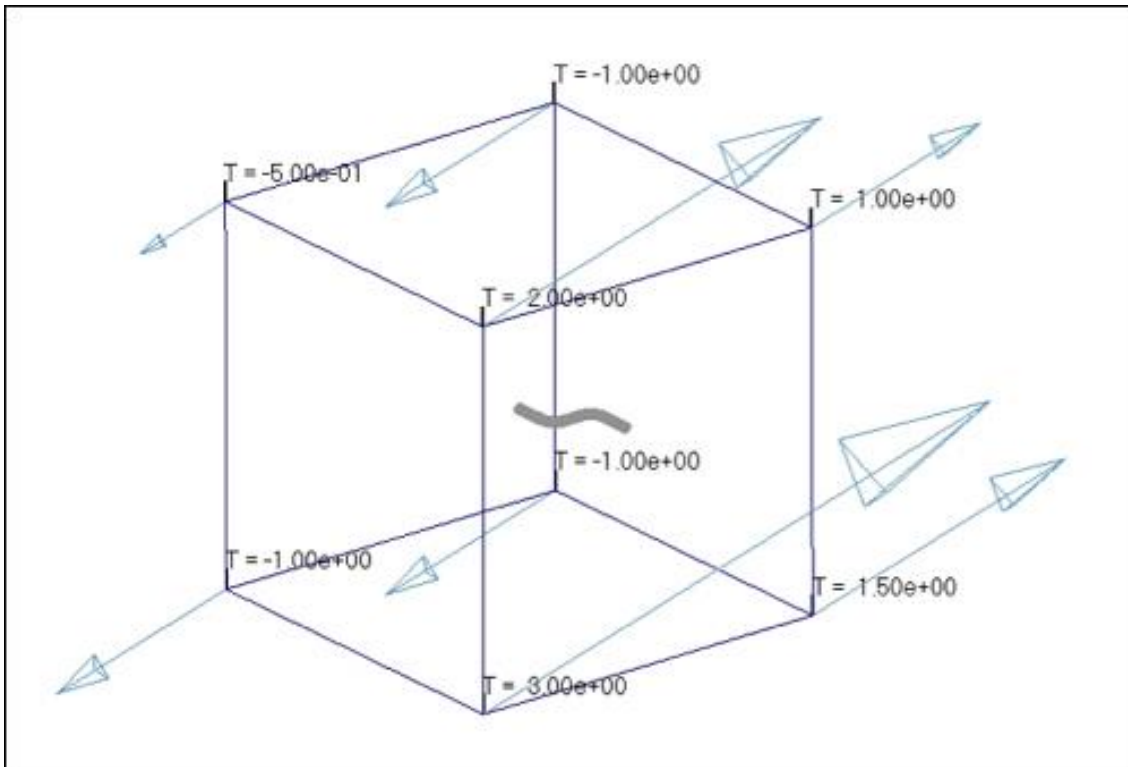4. Click *select*.

5. Click *convert*.

Figure 2: Temperature converted in shape vectors

Note: The temperature loads have been converted into shape vectors.

The shape vectors are proportional to the temperature loads on the corners of the cube and the distances from those corners.

The name of the converted shape is the same as the temperature load collector.

Step 3: Translate the shape.

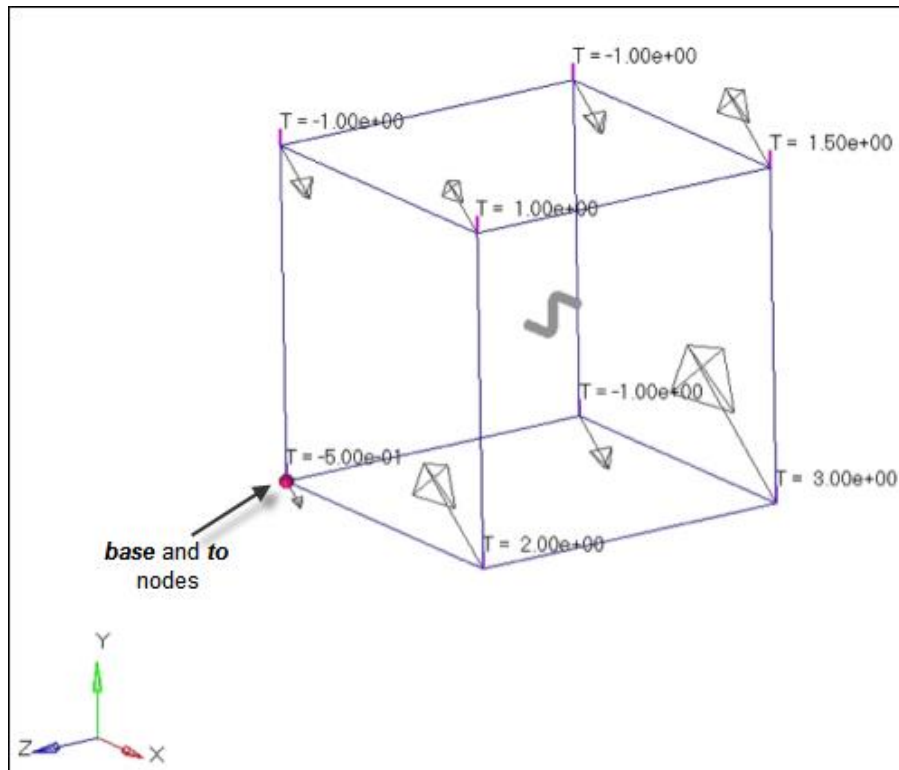1.   Click the ***apply shapes*** subpanel.

Figure 3: The base and the node for translating the shape

2.   Change the operation to ***translate shapes***.

3.   Change **apply only** to ***create new***.

4.   For envelope, use ***auto-envelope***.

5.   For **shapes**, select ***temperature***.

6.   Click ***select***.

7.   For **from: base**, select the node shown in Figure 3.

8.   For **to: nodes**, select the node shown in Figure 3.

9.   Click ***translate***.

     The shape has been transferred to the tube. You selected the same **base** and **to** node, effectively selecting a translate distance of 0.

     A new shape is created with the suffix 1 (**temperature1**).

Step 4: Convert shape vectors to temperature loads.

1.   Click the **convert** subpanel.

2.   Switch the conversion type to ***shapes to temperatures***.

3.   For **shapes**, select ***temperature1***.

4. Click *select*.

5. Click *convert*.

   The shape has been converted into temperature load.

Step 5: Check the result.

1. In the **Model Browser**, right-click and select *Hide* for *Shape*.

2. In the **Model Browser**, right-click component *cube* and select *Hide*.

3. In the **Model Browser**, right-click *LoadCollector* and select *Hide*.

4. From the *BCs* menu, select *Contour Loads*.

   Make sure you expand the Contour Loads utility appropriately to visualize all the buttons.

5. From the list of loads, select *temperature1*.

6. Click *Accept*.

    This takes you to the **Contour** panel.

7. Select *simulation = temperature1*.

8. Select *data type = Temperature*.
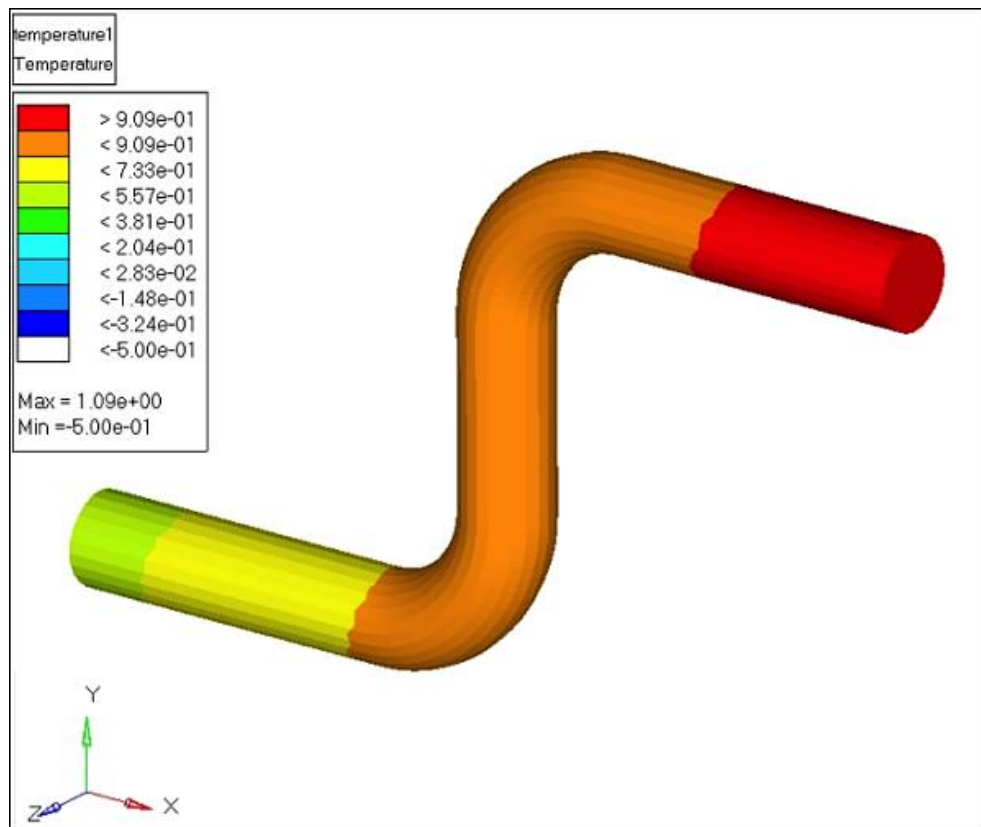
9. Click *contour*.

Figure 4: The contoured temperature results

Summary

Using shapes you have been able to interpolate temperatures from the corners of a volume on to an object located in that volume.