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HyperWorks

Altair HyperView 2019 Tutorials

HV-3050: Viewing Tensor Plots

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HV-3050: Viewing Tensor Plots

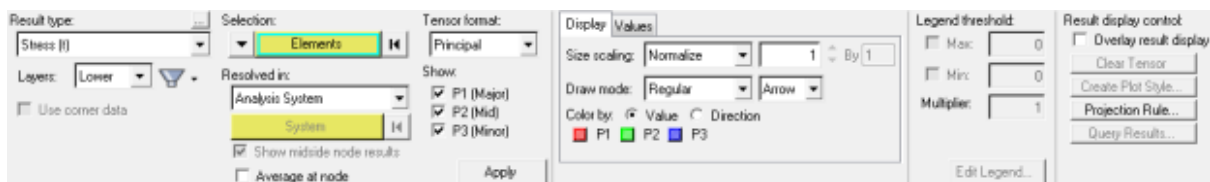
In this tutorial, you will learn how to:

- Use the **Results Browser** to create a tensor plot
- Plot and view tensors
- Select a projection rule for stress transformation and averaging to nodes
- Create and use a **Plot Style** to be accessed in the **Results Browser**

Tools

To access the **Tensor** panel:

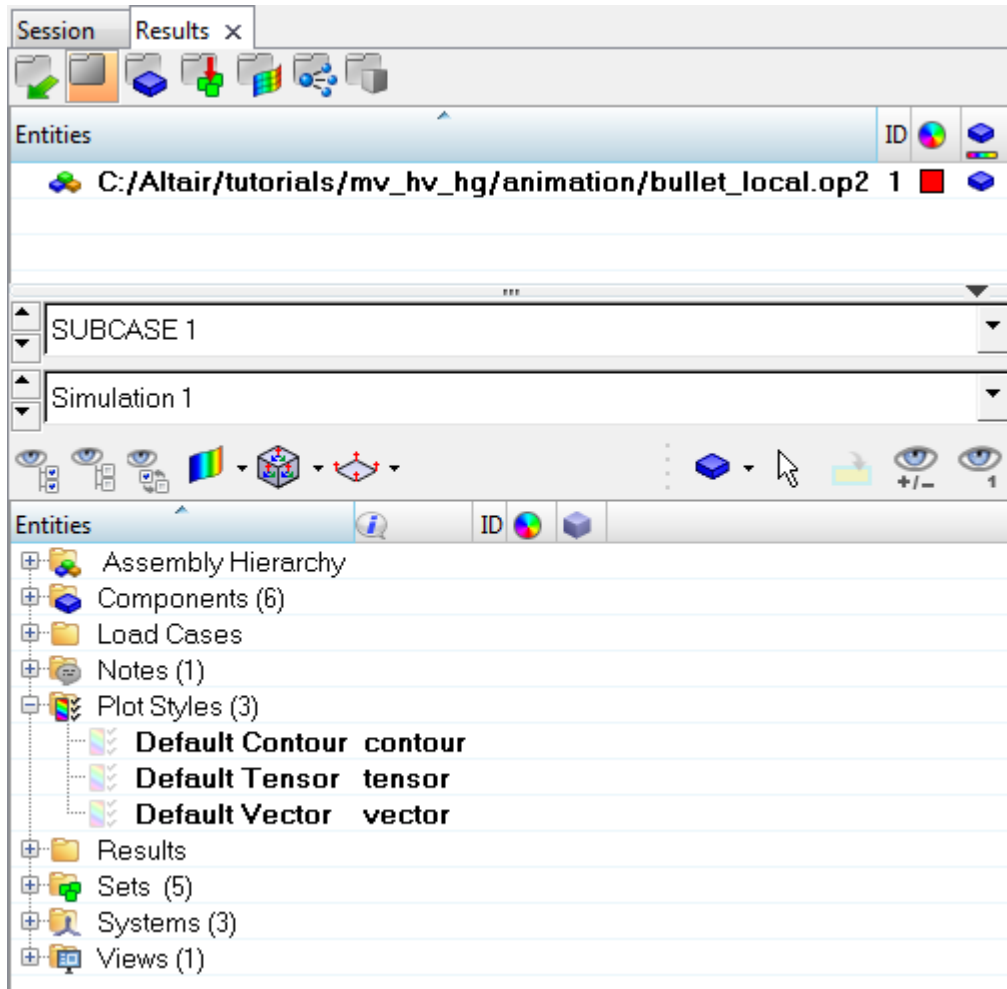
- Click the **Tensor** panel button  on the **Result** toolbar.
- OR
- Select **Results > Plot > Tensor** from the menu bar.



The **Tensor** panel allows you to view tensor plots of stress and strain directions and magnitudes from elemental values.

To access the **Results Browser**:

- Select **View > Browsers > HyperView > Results** from the menu bar.



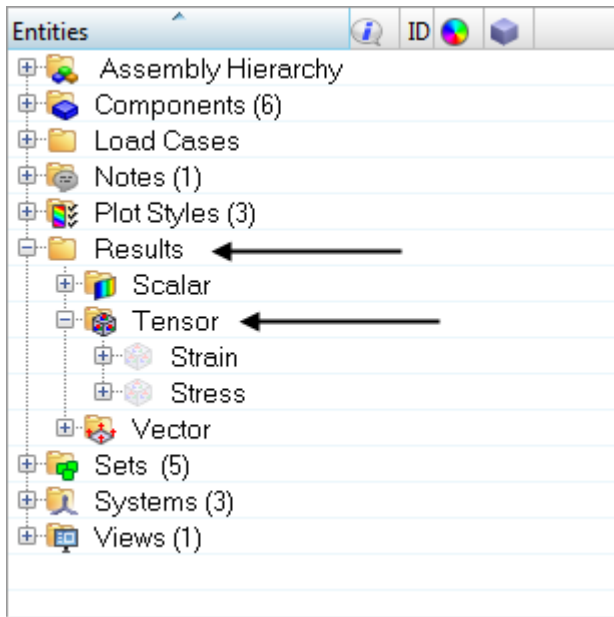
Exercise: Using the Tensor Panel


This exercise uses the model file, `bullet_local.op2`.

Step 1: Viewing tensors in the analysis system using the Results Browser.

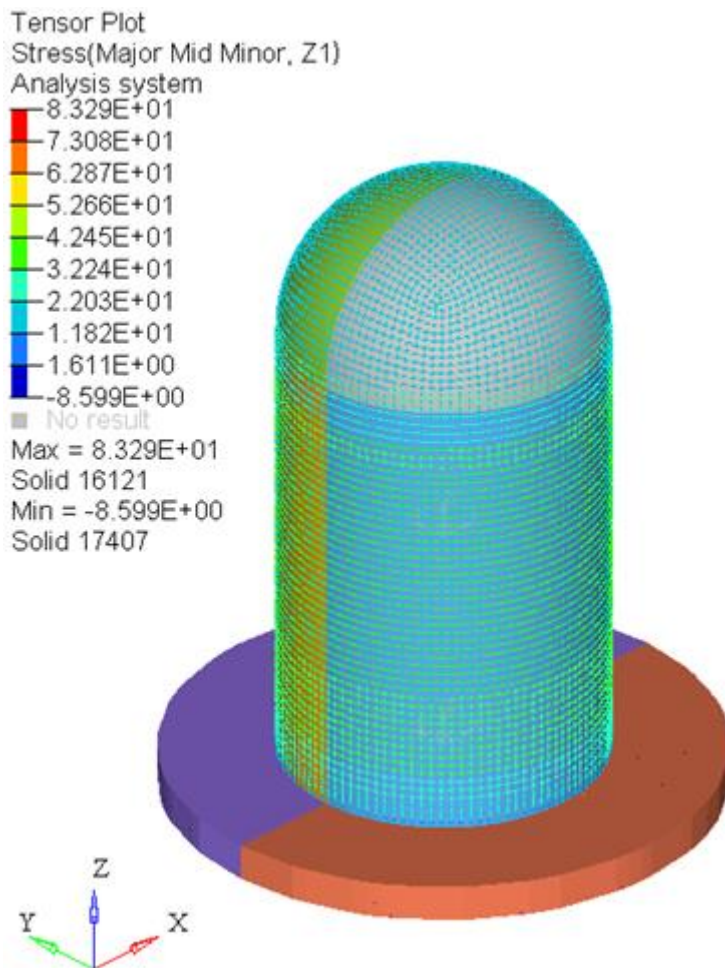
1. Load the `bullet_local.op2` file, located in the `animation` folder.
2. Open the **Results Browser** by selecting **View > Browsers > HyperView > Results** from the menu bar.

- Expand the **Results** and **Tensor** folders.




- Click on the tensor icon  next to **Stress**.

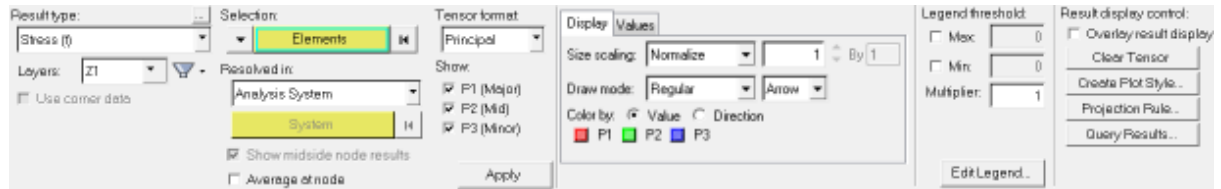
A tensor plot of stress is applied to the model in the graphics area.



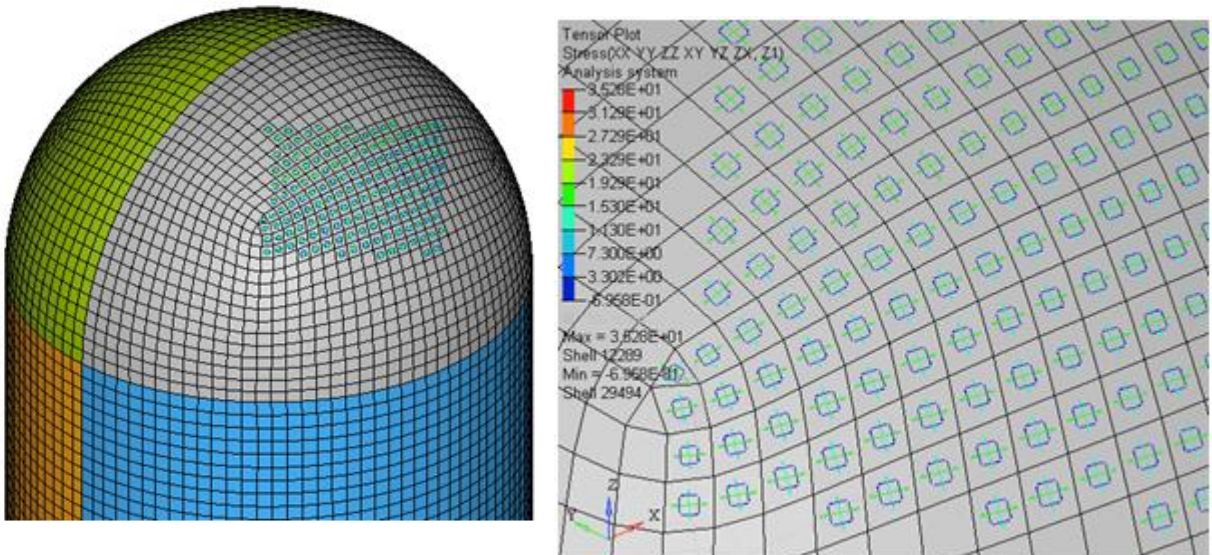
Step 2: Changing the tensor plot settings using the Tensor panel.

1. Click the **Tensor** panel button  on the **Result** toolbar to enter the **Tensor** panel.

Using the **Tensor** panel, additional options can be changed and applied to the tensor plot.

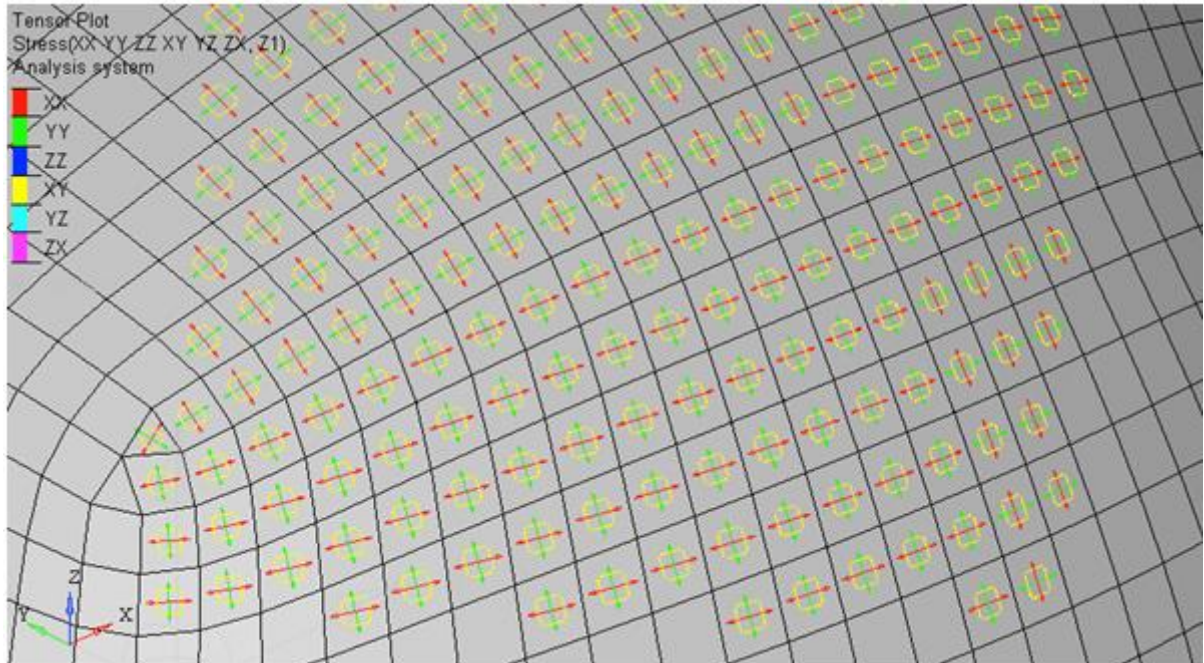


2. Click in the graphics area and press 'M' on the keyboard to display the mesh.
3. For **Result type** select **Stress (t)**.
4. For **Layers** select **Z1**.
5. Verify that **Selection** is set to **Elements** for the active entity type.
6. Verify that **Resolved in** is set to **Analysis System**.
7. Change the **Tensor format** to **Component**.
8. Under **Display options**, verify that **Size scaling** is set to **Normalize**.
9. Verify that **Color by** is set to **Value**, to view the tensors by values.
10. Select elements either by collector type or pick them directly from the screen using the quick window selection mode.



11. Select **Color by: Direction** and view the direction of the vectors.

The legend changes to a category legend to reflect the colors of the directions.



Step 3: Viewing tensors in the global system.

1. Change **Resolved in** to **Global System (proj: none)**.
2. Select a projection rule to calculate in-plane stresses.
 - Click **Projection Rule**.

– Select **Projection (use projected axis as Sxx)** to activate the axis options.

The projection rule status is designated next to the coordinate system type in the **Resolved in** drop-down menu. By default, no projection rule is applied.

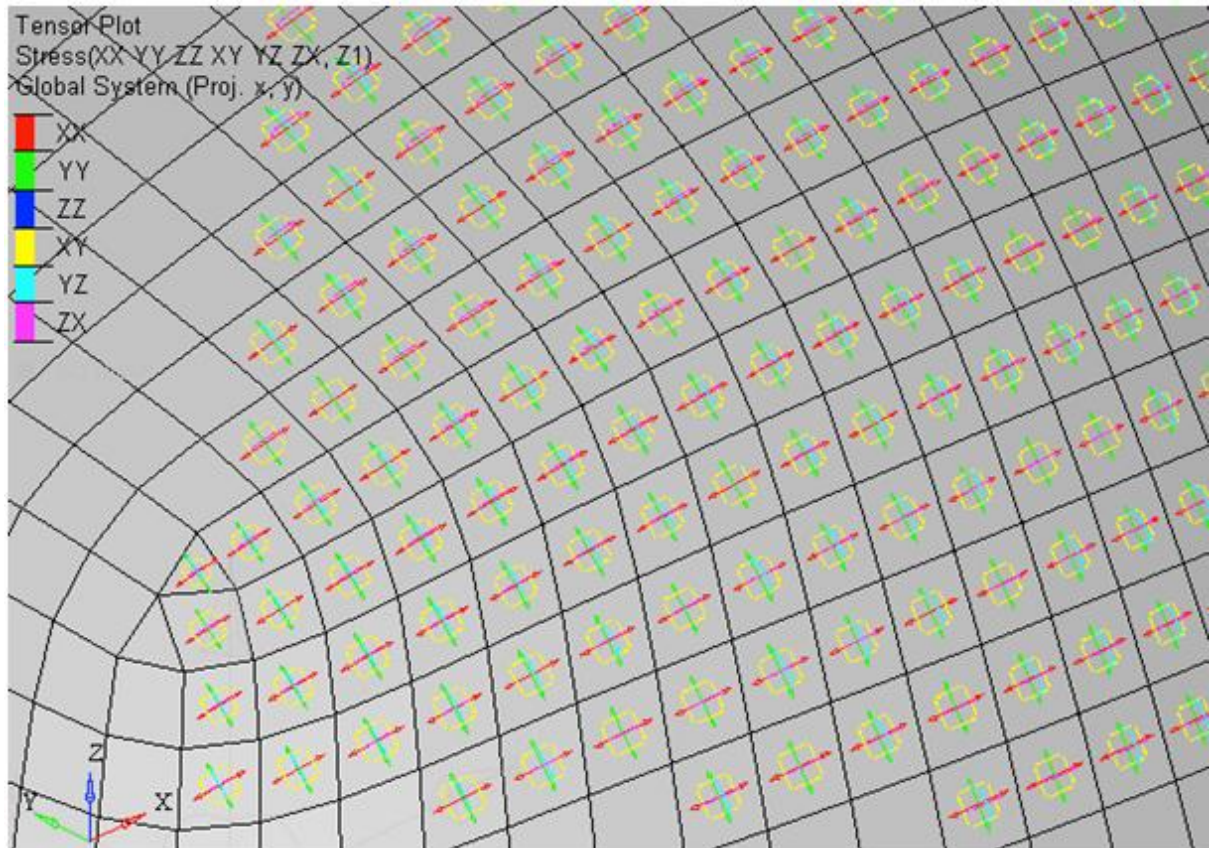
– For the primary axis, select the axis you want to project to the plane of the shell elements.

There are six possible combinations of axes.

If the primary axis is normal to the shell plane, the secondary axis is automatically used.

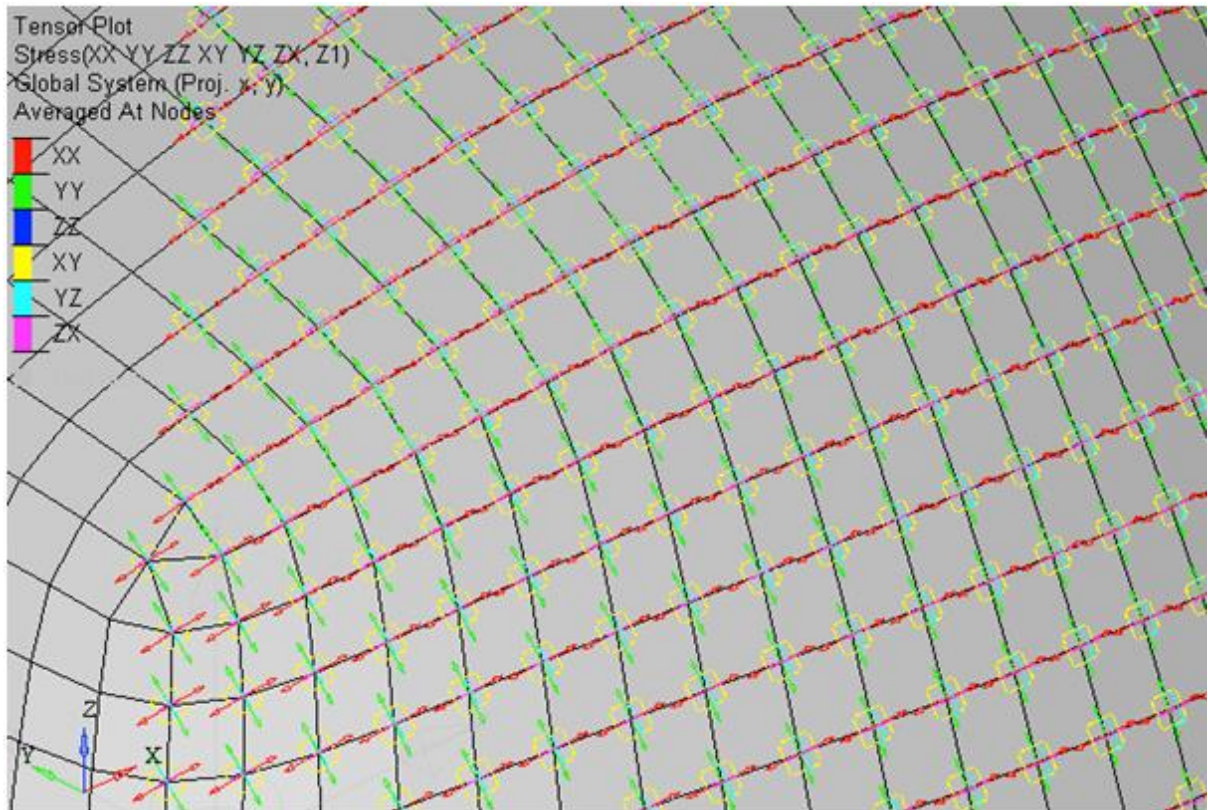
– Click **OK** to accept the settings and close the dialog.

3. Click **Apply** to transform all the stress tensors to the global direction using the projection rule.



4. Activate **Average at node**.

- Click **Apply** to average the stress tensor to the nodes.
Observe that the vectors are located at the nodes.

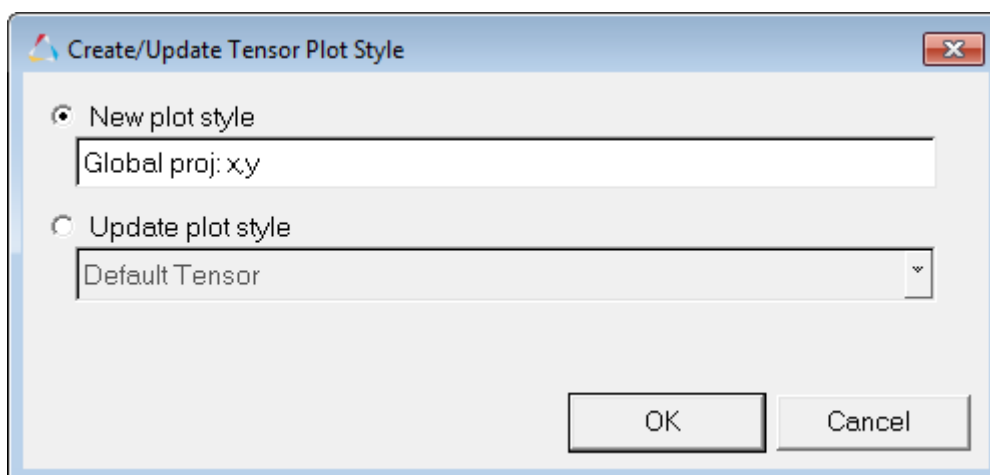


Step 4: Create and use a Plot Style.

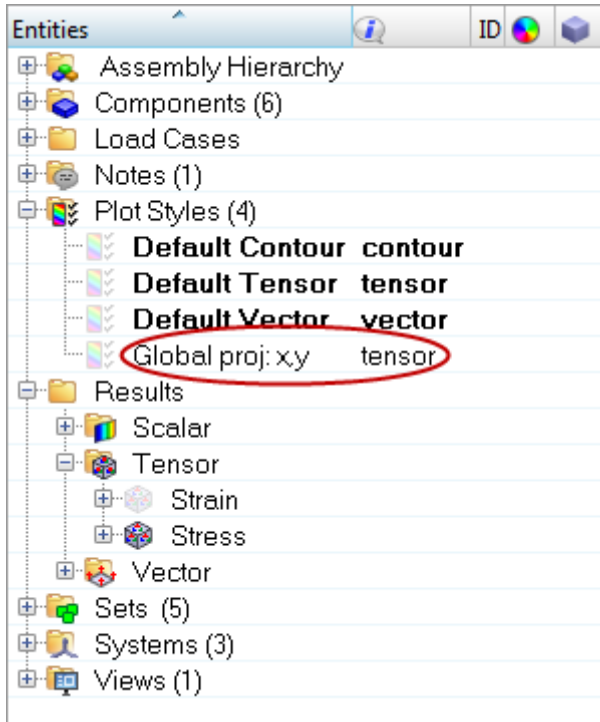
- Click the **Create Plot Style...** button.

Creating a plot style allows you to save the current settings in the **Tensor** panel so that they can be accessed later in the **Results Browser**.

- In the **Create/Update Tensor Plot Style** dialog, enter Global proj: x,y in the **New plot style** text field and click **OK**.

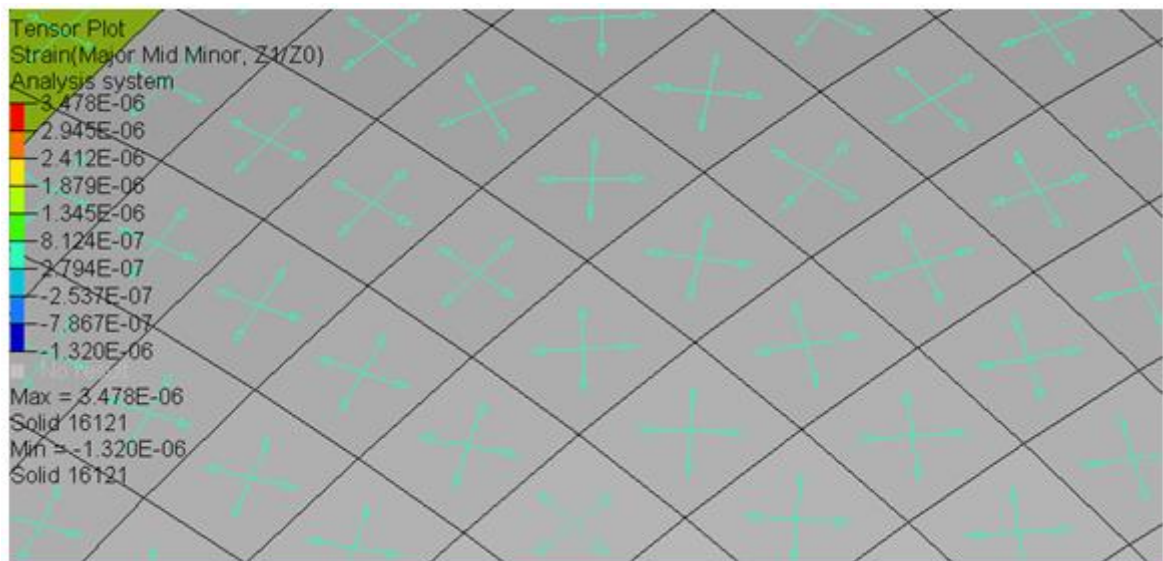


3. In the **Results Browser**, expand the **Plot Styles** folder.
Notice that **Global proj: x,y** is now listed as a plot style.



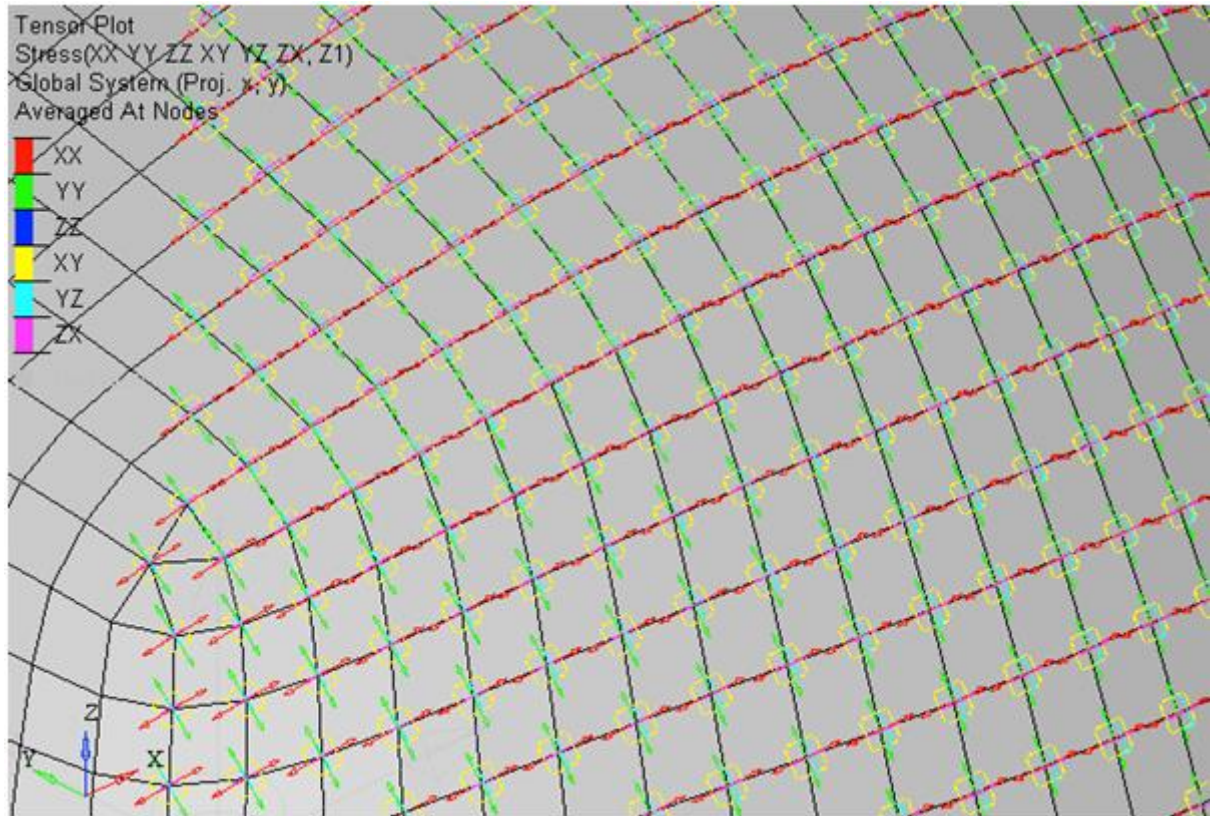
4. Click on the icon next to **Default Tensor** (under **Plot Styles**) to create a tensor plot with stress results using the default tensor plot style.

A tensor plot is applied to the model with stress results that are **Resolved** in the **Analysis System** with no projection rule.



- Click on the **Global proj:x,y** plot style icon to return to the previous tensor plot settings (which were saved to this **Plot Style**).

The stress results are now being **Resolved** in the **Global System** and the x,y projection rule is being used.



- Click **Clear Tensor** in the **Tensor** panel to remove the vector plot.