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HyperWorks

# Altair HyperGraph 2D Tutorials

## HG-1011: Perform Math on Curves Using the Plot Browser

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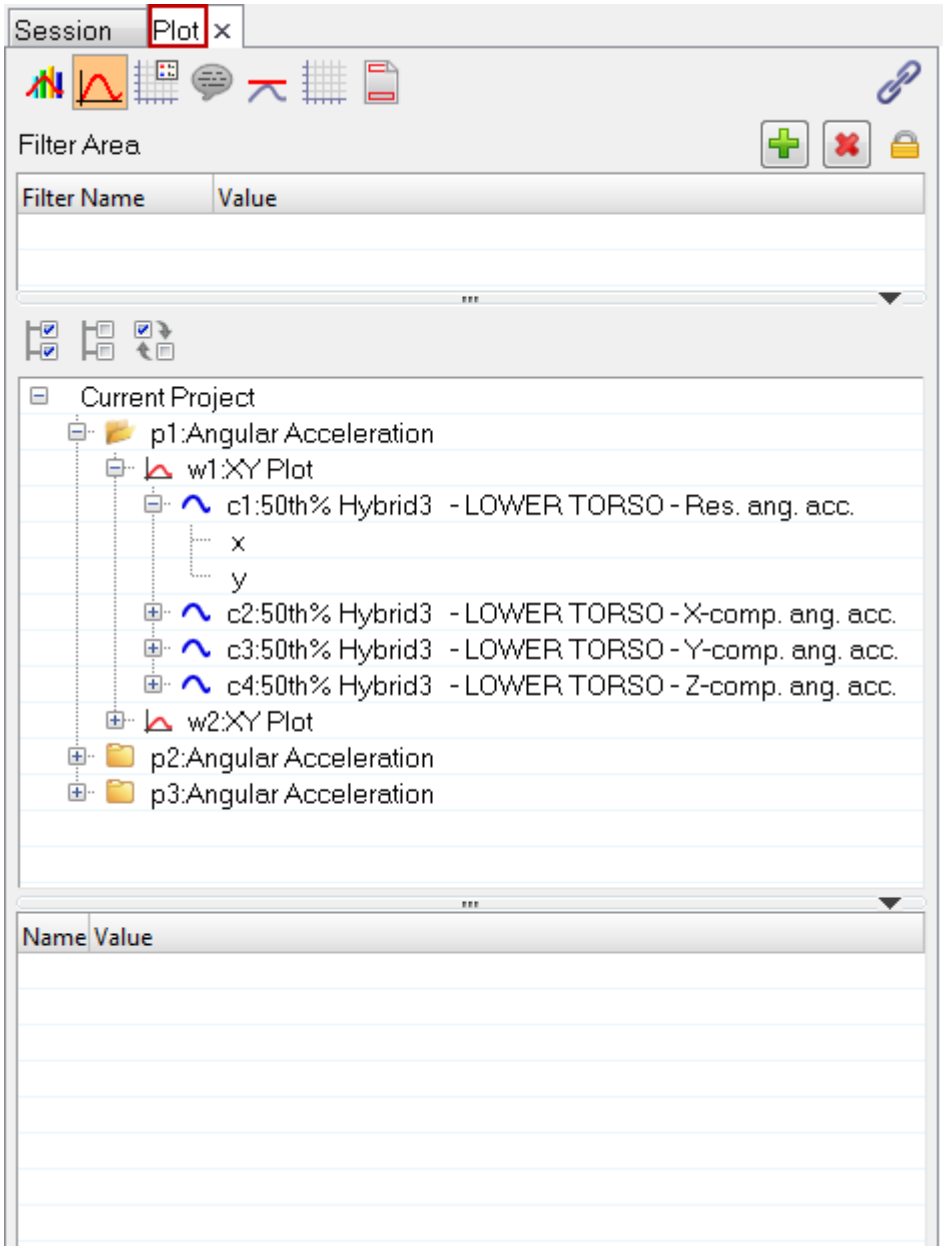
# HG-1011: Perform Math on Curves Using the Plot Browser

In this tutorial you will learn how to use the **Plot Browser** to perform the following tasks:

- Perform math on a single curve in the **Define Curves** panel without creating duplicate curves
- Apply this math to all other curves in the session via the Plot Browser

## Tools

The HyperGraph 2D **Plot Browser** resides on a tab in the **Tab Area** sidebar and allows you to view the HyperGraph 2D plot structure.



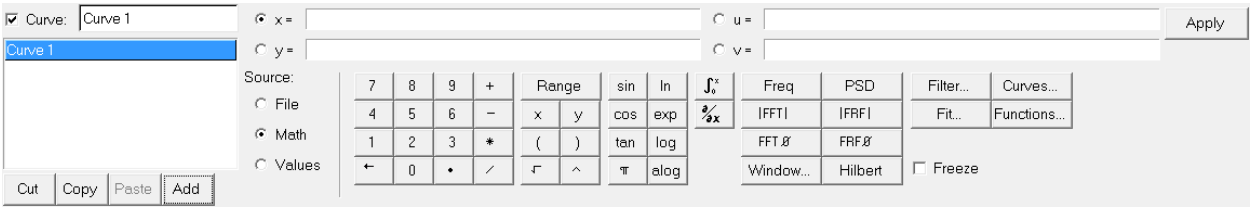
The **Plot Browser** can be turned on or off using the **View > Browsers > HyperGraph 2D > Plot** menu options. A check mark indicates that the HyperGraph 2D Plot Browser is activated for display in the Tab Area.

You can use the Plot Browser tools to search, display and edit entities and their properties within the current session.

From the **Define Curves** panel, you can edit existing curves and create new ones. To edit a curve, it must first be selected either from the curve list or picked from the window.

The X,Y, U, and V vectors are displayed at the top of the **Define Curves** panel. The data sources for these vectors are displayed in the text fields. Click the radio button for a vector or click in the corresponding text box to select that vector for editing. In addition to the traditional X and Y vectors, you can perform math on curves prior to plotting your data with the support of u and v vectors. As a result, only one curve is generated in the session, whereas in the older versions of HyperGraph, this could not be done without an initial curve.

To use math as a data source, from the ***Define Curves*** panel, select ***Source > Math***.




# Exercise: Perform Math on a Single Curve

## Step 1: Open Session File `demo_browser.mvw`.

1. From the **File** menu click ***Open*** > ***Session***.
2. From the `plotting` folder, select the `demo_browser.mvw` file and click ***Open***.

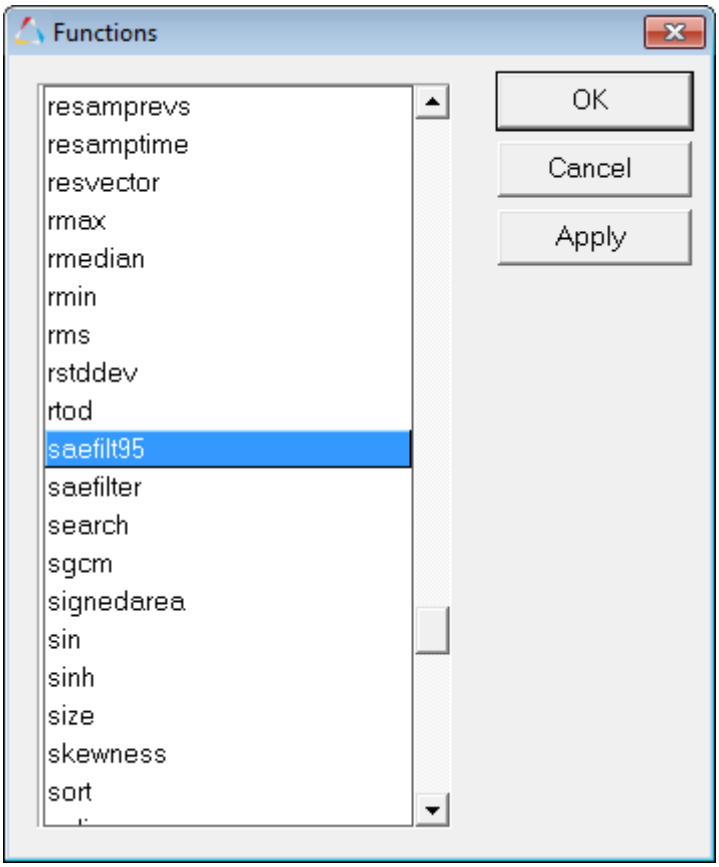
## Step 2: Use the Define Curves panel to apply an SAE filter to a curve.

1. From the toolbar, select the ***Define Curves*** icon, .
2. Activate the ***x=*** radio button.
3. Under **Source**, select ***Math***.
4. In the **x= field**, enter `u`. This applies the u vector to the x vector.
5. Click ***Apply***.
6. Activate the ***y=*** radio button.
7. Under **Source**, select ***Math***.
8. In the **y=** field, enter `v`. This applies the v vector attributes to the y vector.
9. Click ***Apply***.

You can now apply math to the y vector.

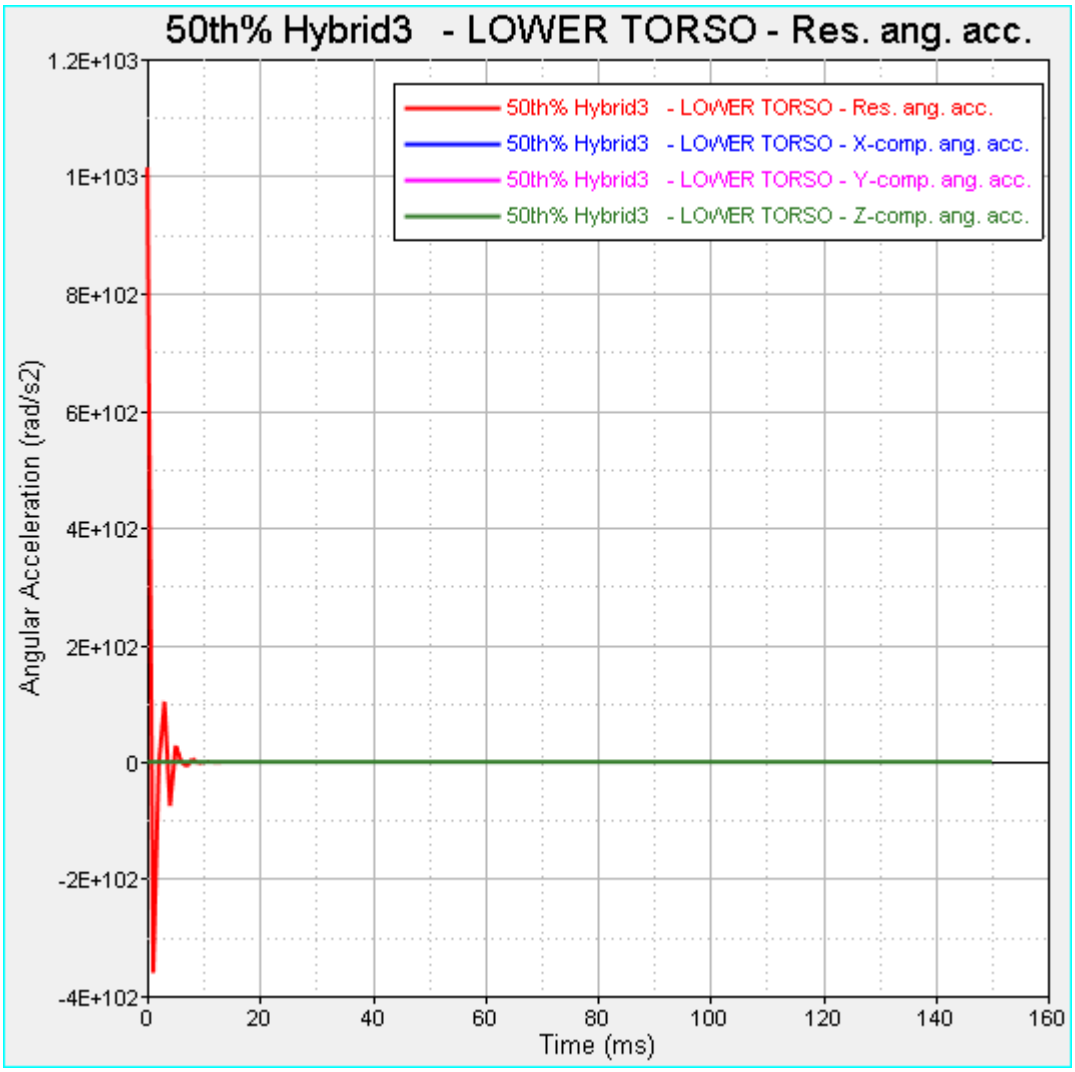
10. For the y vector, remove the **v** vector you entered in step 8.
11. With your cursor in the **y=** field, click ***Functions...***.

12. From the **Functions** dialog, select ***saefilt95*** and click ***OK***.



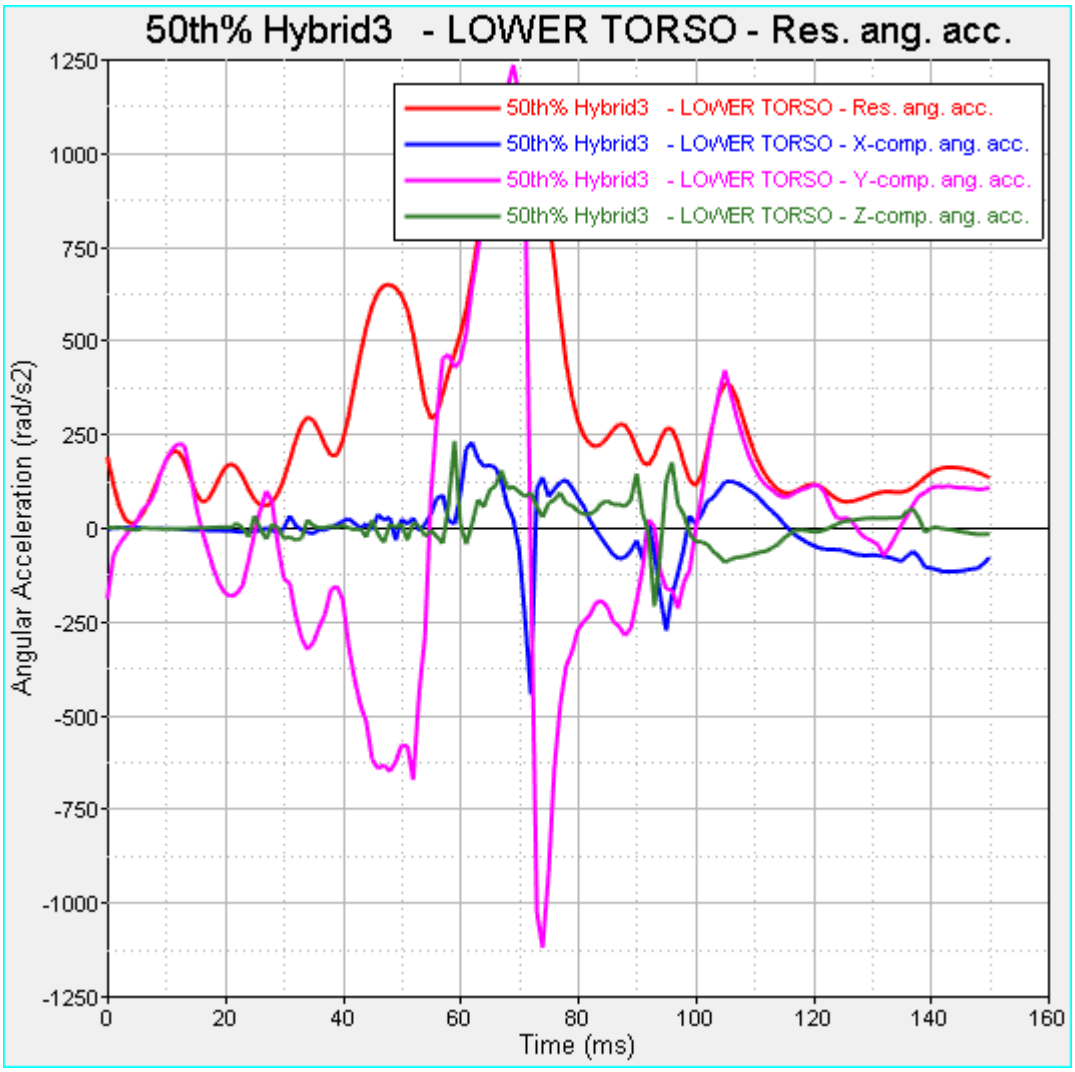

13. The saefilt95 function takes six arguments: `vector1, vector2, scalar1, scalar2, scalar3, scalar4`.
14. Enter the following text in the function: saefilt95(u,v,60,20,3) and click ***Apply***.

15. The result is a corrupt curve. This is because the function expects the time to be in seconds, and our curve is in milliseconds.



16. To correct this, you must apply the time vector by **0.001**. Enter the following in the **y=** field: `saefilt95(u*0.001,v,60,20,3)`.

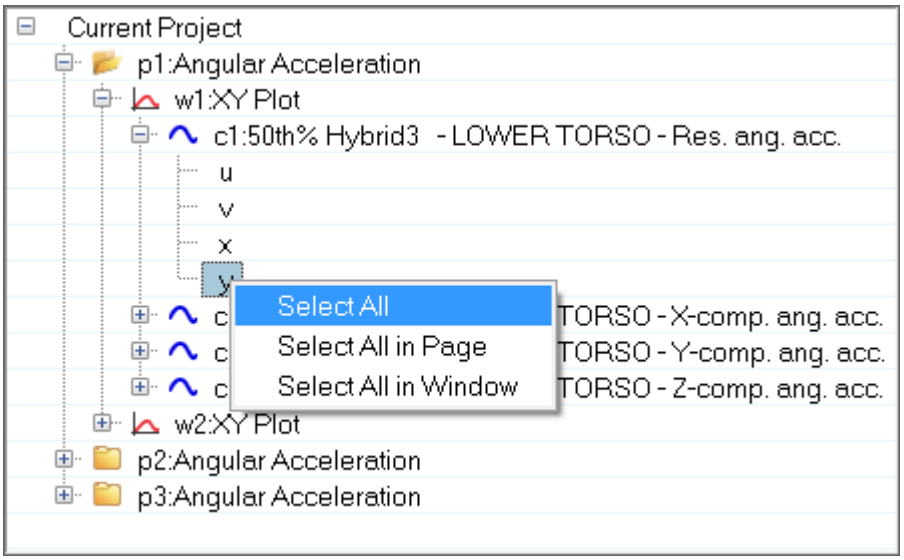
    The result is a properly filtered curve:



## Step 3: Apply the math performed in Step 2 to all other curves in the session via the Plot Browser.

In this step, you will apply the filter defined in Step 2 to all curves in the session using the Plot Browser.

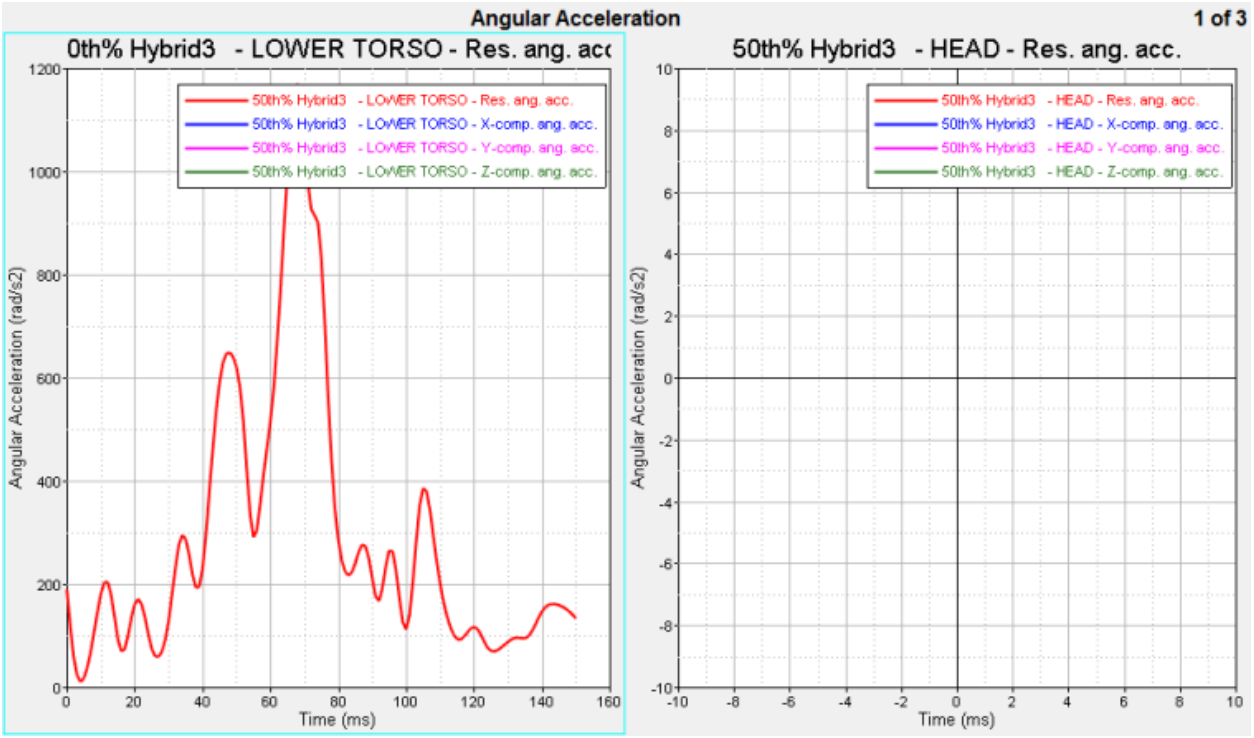
1. From the **Define Curves** panel, highlight the y vector filter you added in step 1 and press CTRL+C to copy it.
2. From the **Plot Browser**, select the Curves icon from the top of the browser. This filters the session information so that only the curve information is displayed in the Plot Browser.
3. Expand the folders for page 1 (**p1: Angular Acceleration**) and window 1 (**w1:XY Plot**) by clicking the plus button next to each folder.
4. As shown below, right-click on the **y vector** and select ***Select All***.




All y vectors in the session are selected.

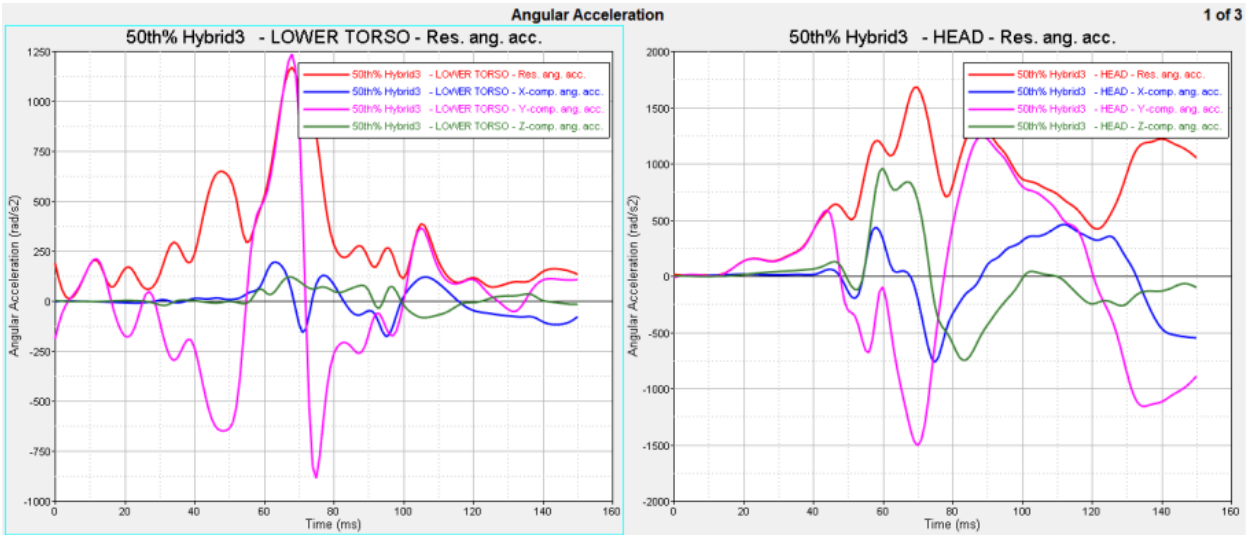
5. Go to the **Properties Table** at the bottom of the Plot Browser.
6. From the **Source** drop-down menu, select ***Math***.

7. Notice that all the curves in the graphics area disappear, except for the curve we have already filtered on the **Define Curves** panel.



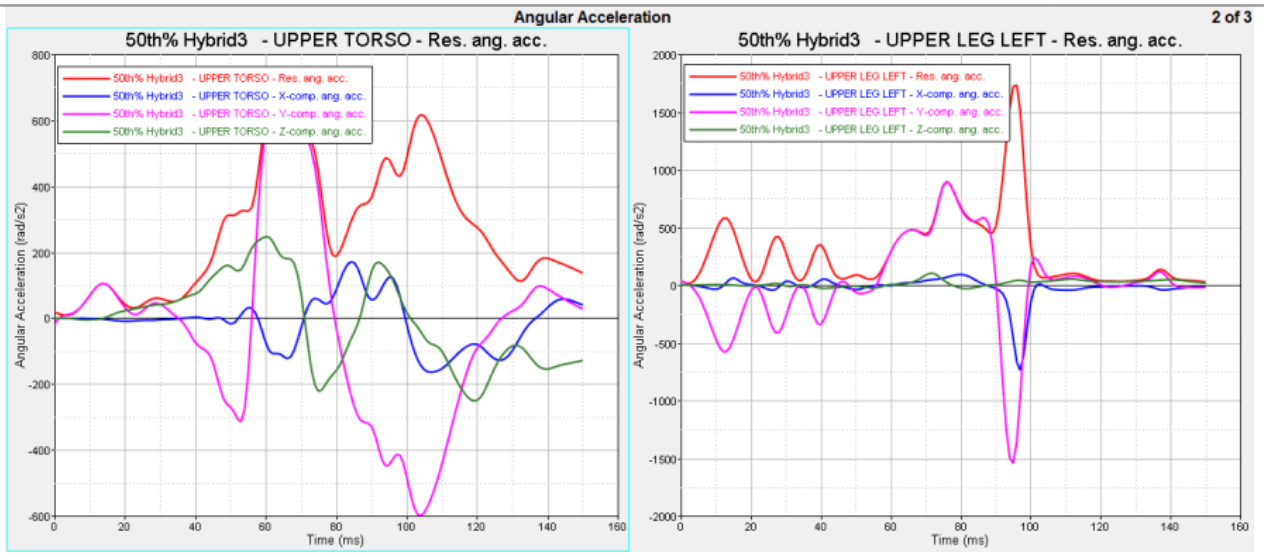

8. Click in the **Expression** field and paste the filter you copied from the Define Curves panel and press ENTER.

   All curves in the session now contain the same filter and math.




9. It is not required, but you can also apply math to the x vector. Similar to the steps above, right-click on the ***x*** vector from the Plot Browser and select ***Select All*** to select all x vectors in the session.
10. From the **Source** drop-down menu, select ***Math***.
11. In the **Expression** field, enter `u`.

    Now all vectors in the session have the same math.


Angular Acceleration
2 of 3
50th% Hybrid3 - UPPER TORSO - Res. ang. acc.
50th% Hybrid3 - UPPER TORSO - Res. ang. acc.
50th% Hybrid3 - UPPER TORSO - X-comp. ang. acc.
50th% Hybrid3 - UPPER TORSO - Y-comp. ang. acc.
50th% Hybrid3 - UPPER TORSO - Z-comp. ang. acc.
Angular Acceleration (rad/s2)
Time (ms)
50th% Hybrid3 - UPPER LEG LEFT - Res. ang. acc.
50th% Hybrid3 - UPPER LEG LEFT - Res. ang. acc.
50th% Hybrid3 - UPPER LEG LEFT - X-comp. ang. acc.
50th% Hybrid3 - UPPER LEG LEFT - Y-comp. ang. acc.
50th% Hybrid3 - UPPER LEG LEFT - Z-comp. ang. acc.
Angular Acceleration (rad/s2)
Time (ms)