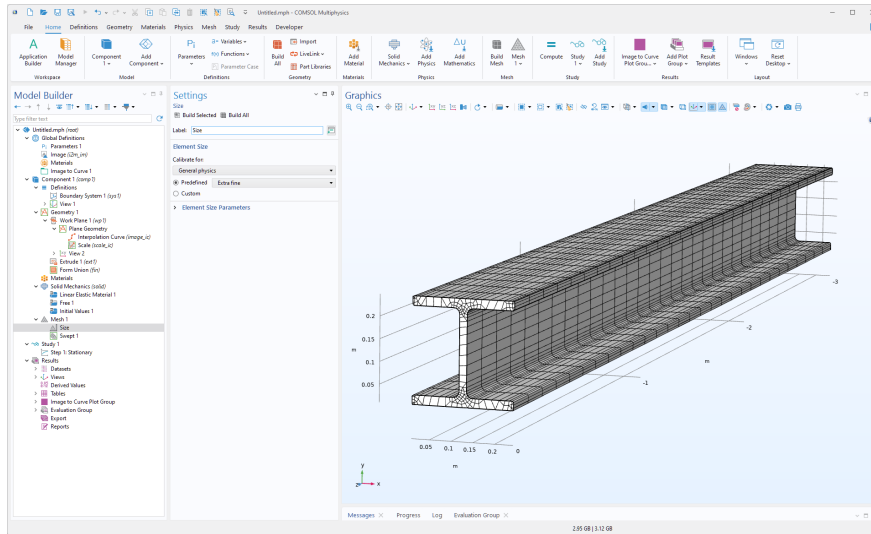


Add-in created in COMSOL Multiphysics 6.4

Image to Curve

Introduction

The Image to Curve add-in lets you use an image as a starting point for an analysis. An interpolation curve is created from a contour plot of an imported image. This interpolation curve can then be used as part of a geometry. The figure below shows a swept mesh based on an image of an I beam. In this case the 3D model was created by extruding the image-based 2D solid geometry.



Add-in Library path: COMSOL_Multiphysics/image_to_curve

Using the Image to Curve Add-in

TOOLBAR

Use the toolbar at the top of the **Settings** window for navigating between the different steps.

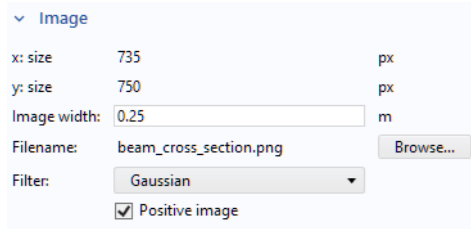


Click **Browse** to load a new image file. **Plot** renders the original imported image without any filter. **Filter** renders the filtered image using the **Filter** specified in the **Image** section. **Contour** plots image contours using threshold settings from the **Contour** section. **Curve**

creates an **Interpolation Curve** node in a 2D **Geometry** sequence or a 3D **Work Plane**. The curve interpolation tolerance can be adjusted in the **Curve** section. **Reset** resets all values to factory settings.

IMAGE

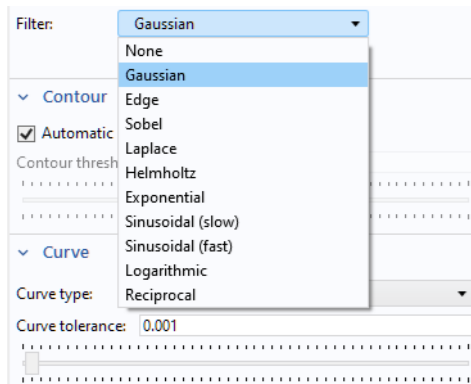
To import an image, in the **Image** section of the **Settings** window for the add-in, click the **Browse** button. This opens a file browser where you can select an image for import.



After import, the **Image** section will display information on the image size in pixels (**x size** and **y size**), the **Image width** in terms of the current length unit as determined by the **Geometry** node, the **Filename**, and the **Filter** used to process the image. Clearing the checkbox for **Positive image** will create a negative image.

By changing the **Image width** value you can adjust the dimensions of the final geometry. This could also be changed later by adding a **Scale** feature node to the **Geometry** sequence.

The **Filter** options include a few image processing filters including blur and sharpening filters, as shown in the figure below.



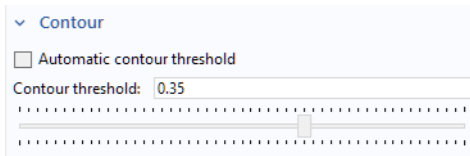
Use these filters to reduce noise (blur), enhance edges (sharpen), or create new edges in the imported image. Changing the filter will change the shape of the curve extracted from

the image. The default is a **Gaussian** blur filter. If needed, use a dedicated image processing software to further process the image before import.

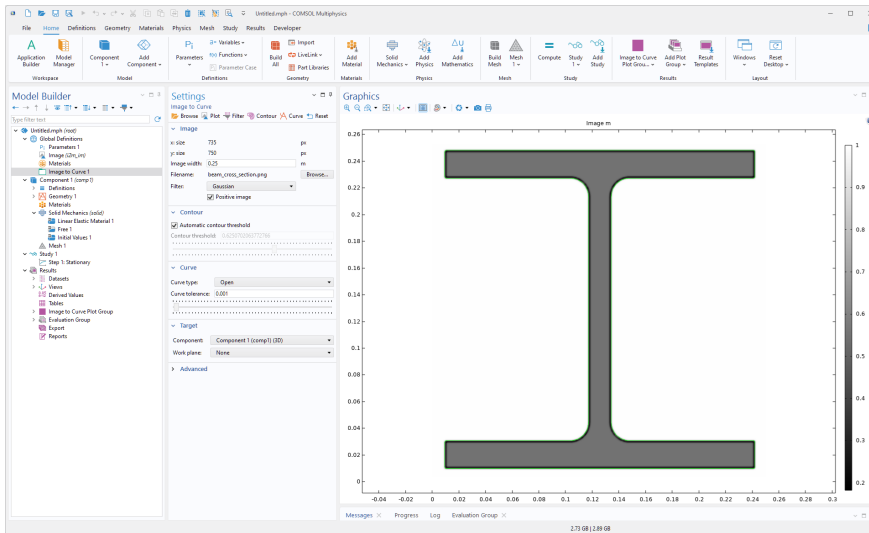
Click the **Plot** or **Filter** button in the toolbar to render the original or filtered image, respectively.

CONTOUR

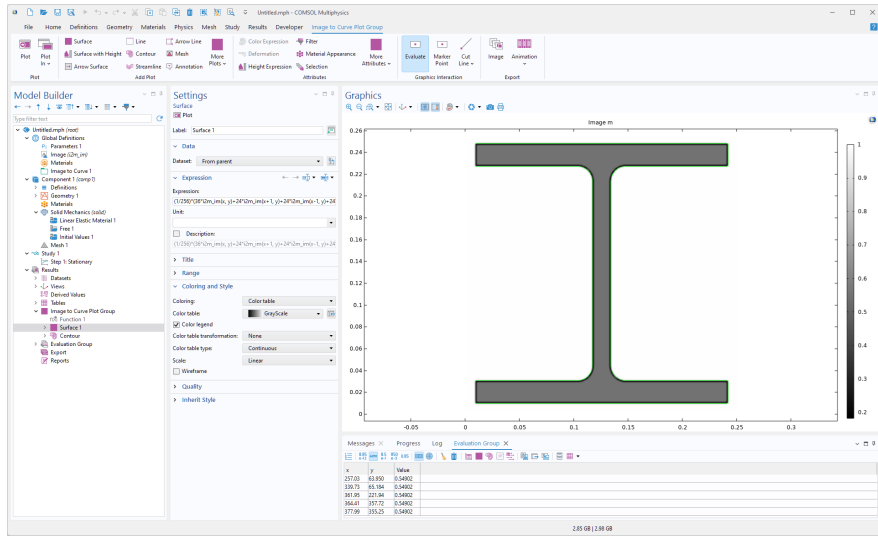
By default, contour curves are automatically placed relative to an approximate average threshold level with respect to the pixel intensity level in the filtered image. To manually control the **Contour threshold**, clear the **Automatic contour threshold** checkbox.



Click the **Contour** button in the toolbar to visualize the contour curves and image, as shown in the figure below in the case of an imported image of an I-beam profile.

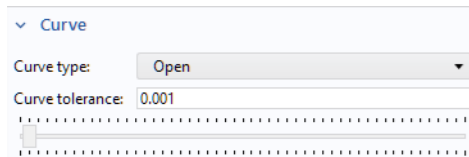


To inspect the pixel values, in the **Image to Curve Plot Group**, select the **Surface** node, and click in the **Graphics** window. The pixel values and coordinates are displayed in an **Evaluation 2D** table, as shown in the figure below.

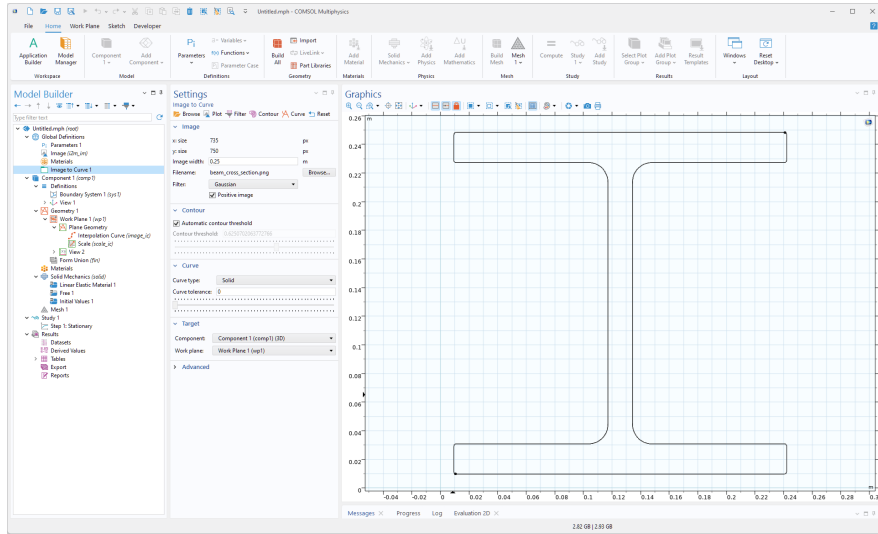


CURVE

Click the **Curve** button in the toolbar to generate an **Interpolation Curve** node in a 2D **Geometry** sequence or a 3D **Work Plane**. By default, the **Curve type** is set to **Open** but you can change this to **Closed** or **Solid**. The **Curve tolerance** setting determines how closely the curve should approximate the contour curves.

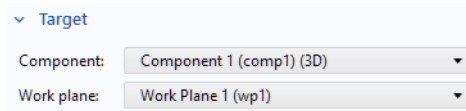


The figure below shows the I beam example using **Solid** for the **Curve** type and a **Curve** tolerance of 0.0.



TARGET

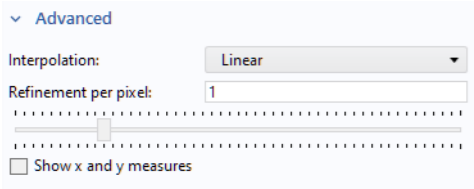
In the **Target** section, you can specify the **Geometry** sequence for which the **Interpolation Curve** node should be created. You can specify the model **Component** and, in the 3D case, you can also specify the **Work Plane**.



ADVANCED

In the **Advanced** section, you can change the **Interpolation** method used to visualize the image. Select between **Linear** and **Nearest neighbor** interpolation. The **Refinement per pixel** setting determines the number of grid cells per pixel used to represent the image. A value lower than 1.0 means the grid used to represent the image has fewer interpolation points

than the number of pixels in the image. A value greater than 1.0 means that the grid will oversample the image.



The **Show x and y measures** checkbox controls visualization of the dimensions of the contour curves.

