
STATIONARY FLOW VISUALIZATION

Integrates a vector field in order to produce streamlines, animated streamlines and streamlines with glyph flow.

Description

The module integrates a vector field and creates static or animated streamlines or streamlines with glyph flow. The streamlines start in a user defined subset of points from within the input field.

Input data

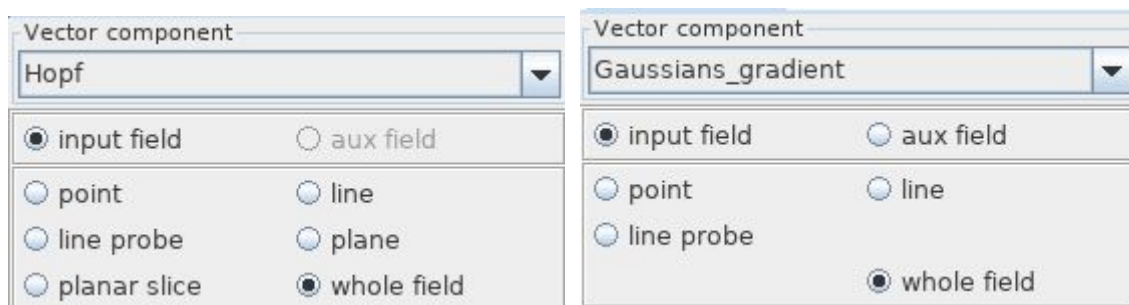
The module requires a field with at least one $veclen=3$ or $veclen=2$ component. Optionally there is an input port for a second input field which defines a subset of starting points.

Output data

At output there is a 3D irregular field of streamlines and a 3D geometry object of streamlines field.

Computation parameters

The user defines the **vector component** which will be used to generate the streamlines and the set of **starting points**.



The **vector component** drop down list contains all input field components of $veclen=3$ or $veclen=2$. The user chooses the component for which streamlines will be calculated. By default, the first component of the list is used.


The subset of **starting points** is defined in the radio button menu below the vector component drop down list. The user can choose starting points from the **input field** or a second **aux field** which is delivered through the second input port. In the first case the whole field or its subsets like point, line (line probe, line) or slice (planar slice, plane) can be


chosen. The options depend on the data dimension. In the second case the whole alternative input field is chosen.

If **point** is chosen the user can adjust the starting point using the i,j,k - sliders.


<input checked="" type="radio"/> point	<input type="radio"/> line
<input type="radio"/> line probe	<input type="radio"/> plane
<input type="radio"/> planar slice	<input type="radio"/> whole field


i:		<input checked="" type="checkbox"/>	8.000
			4.000
			0.000

j:		<input checked="" type="checkbox"/>	10.000
			5.000
			0.000

k:		<input checked="" type="checkbox"/>	12.000
			6.000
			0.000

<input checked="" type="radio"/> point	<input type="radio"/> line
<input type="radio"/> line probe	<input type="radio"/> whole field

i:		<input checked="" type="checkbox"/>	160.00
			80.00
			0.00

j:		<input checked="" type="checkbox"/>	250.00
			125.00
			0.00

If **line** is chosen the user can adjust the line using the **Line axis** radio button menu and appropriate **i, j, k** - sliders.

☐ point
 ☒ line

☐ line probe
 ☐ plane

☐ planar slice
 ☐ whole field

Line axis:
 ☒ i
 ☐ j
 ☐ k

j:

☒

10.000
5.000
0.000

k:

☒

12.000
6.000
0.000

☐ point
 ☒ line

☐ line probe
 ☐ plane

☐ whole field

Line axis:
 ☒ i
 ☐ j

j:

☒

62.00
31.00
0.00

Analogously, if plane is chosen in 3D the user can adjust the plane using the **Axis** radio button menu and a **Slice** slider.

☐ point
 ☐ line

☐ line probe
 ☒ plane

☐ planar slice
 ☐ whole field

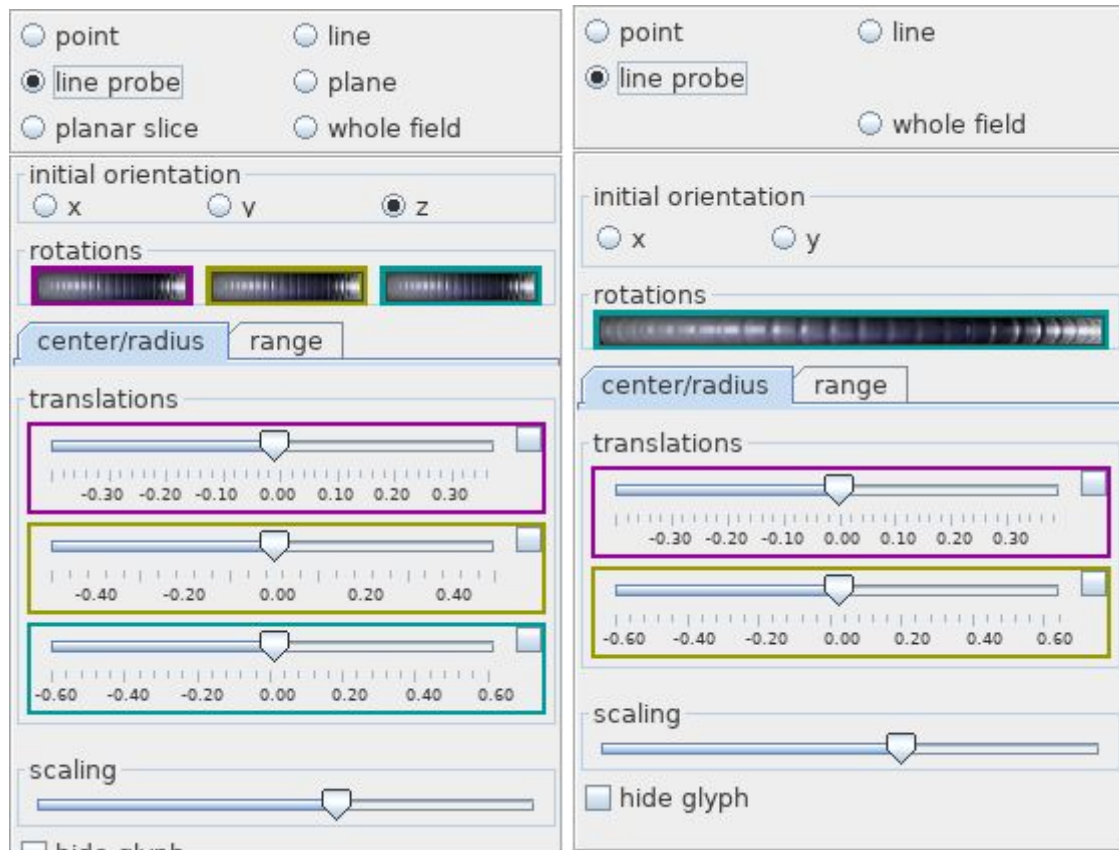
Axis:
 ☒ i
 ☐ j
 ☐ k

Slice:

☒

8.000
4.000
0.000

In the case of **line probe** a glyph appears in the viewer to signal the position of the line. The line can be placed using the **initial orientation** radio button menu, the **rotations** wheels and the **translations** sliders. The glyph size can also be **scaled**, and the glyph can be hidden by using the **hide glyph** option.



Analogously, in 3D the **planar slice** option turns on the planar slice glyph which can be manipulated using the **initial orientation** radio button menu, the **rotations** wheels and the **translations** sliders. The glyph size can also be **scaled**, and the glyph can be hidden by using the **hide glyph** option.

☐ point ☐ line
☐ line probe ☐ plane
☒ planar slice ☐ whole field

initial orientation

☐ x ☐ y ☒ z

rotations

center/radius range

translations

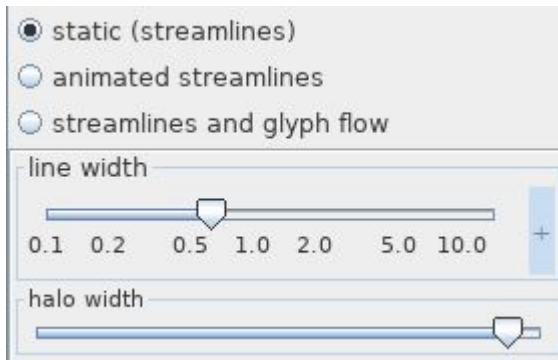
scaling

☐ hide stubs

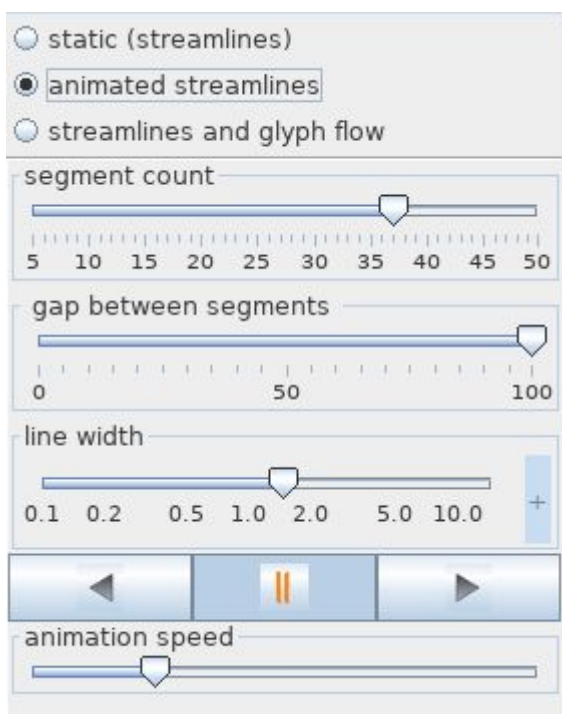
Presentation parameters

Datamap tab parameters are described in the common interfaces section under the Presentation Panel entry.

In the **Display** tab the user chooses the type of streamlines as static (streamlines), animated streamlines or streamlines and glyph flow) in a radio button menu.



In case of static streamlines the user can change **line width** and **halo width**. Mouse click on the plus sign on the right hand side of the line width slider opens text input fields for minimum, current and maximum value of line width.



Animated streamlines are short line segments which move along streamlines. The length of the segments is proportional to the absolute value of velocity. The **segment count** slider defines the number of segments on a streamline. The **gap between segments** slider defines the gap length between the segments. The **line width** slider determines the animated streamlines width. A set of buttons allows to display the animation forward and backward and to pause animation. Animation speed is defined by the **animation speed** slider.

The screenshot shows a software interface with the following controls:

- Three radio buttons at the top: ☐ static (streamlines), ☐ animated streamlines, and ☒ streamlines and glyph flow.
- A dropdown menu labeled "glyph size component" with "density" selected.
- A dropdown menu labeled "glyph" with "sphere" selected.
- A "glyph smooth..." slider with a small icon to its left.
- A "Downsize" section with three input fields: "I:" (value 1), "J:" (value 1), and "K:" (value 1). Below these are three buttons: "Dynamic", "No down", and "Default".
- Two checked checkboxes: "square root scale" and "absolute value".
- An unchecked checkbox: "constant size glyphs".
- A "glyph scale" slider with tick marks at 0.01, 0.02, 0.05, 0.1, 0.2, and 0.5.
- A "line thickness" slider.
- A "number of batches" input field with the value 1.
- Three radio buttons: ☐ once, ☒ cycle, and ☐ continuous.
- Two buttons: "reset" (with a left arrow icon) and "animate" (with a right arrow icon).
- A "slow down animation" slider.

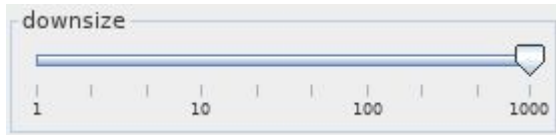
The third presentation option of streamlines is a glyph flow along streamlines. The **glyph size component** drop down list defines the component of the input field which is used to scale the glyphs. By default the first component in the list is used.

There are different glyph geometries in the **glyph** drop down list. For scalar data these are *sphere*, *raindrop*, *snowflake*, *box*, *diamond*. For vector data these are *arrow*, *arrow3D*, *cone*, *tube*, *circle*, *simple arrow*, *symmetric segment*, *segment*.

The **glyph smoothness** slider adjusts the smoothness of glyphs.

In case of regular fields the user can adjust downsize factors using the **Downsize** input text fields. Downsize reduces the size of the field, saving processing time and memory by "thinning out" the data. Default downsize values depend on the size of the input field and are chosen automatically.

If **Dynamic** button is switched on output is generated every time the downsize parameter changes. **No down** button cancels downsize. **Default** button adjusts the default values for downsize.



In the case of irregular fields the user adjusts the downsize factor using the downsize slider.

By default, the scale of the glyphs is defined by the **absolute value** of the data. The user can also choose **square root scale** or **constant size glyphs**.

The **glyph scale** slider allows to scale the glyph size. The user defines the scale using either the slider or the text input fields for minimum, maximum and current value on the right hand side of the slider. The text input fields appear with mouse click at + on the right hand side of the slider, and disappear with mouse click at -.

The **line thickness** slider defines thickness of lines.

The user can determine the number of exposed glyphs per streamline in the **number of batches** input field.

There are three options for running an animation:

- **once**: animation is performed once
- **cycle**: animation is repeated
- **continuous**:

The **reset** button sets animation to the first frame, the **animate** button runs the animation.

The **slow down animation** slider defines the animation speed.

Example