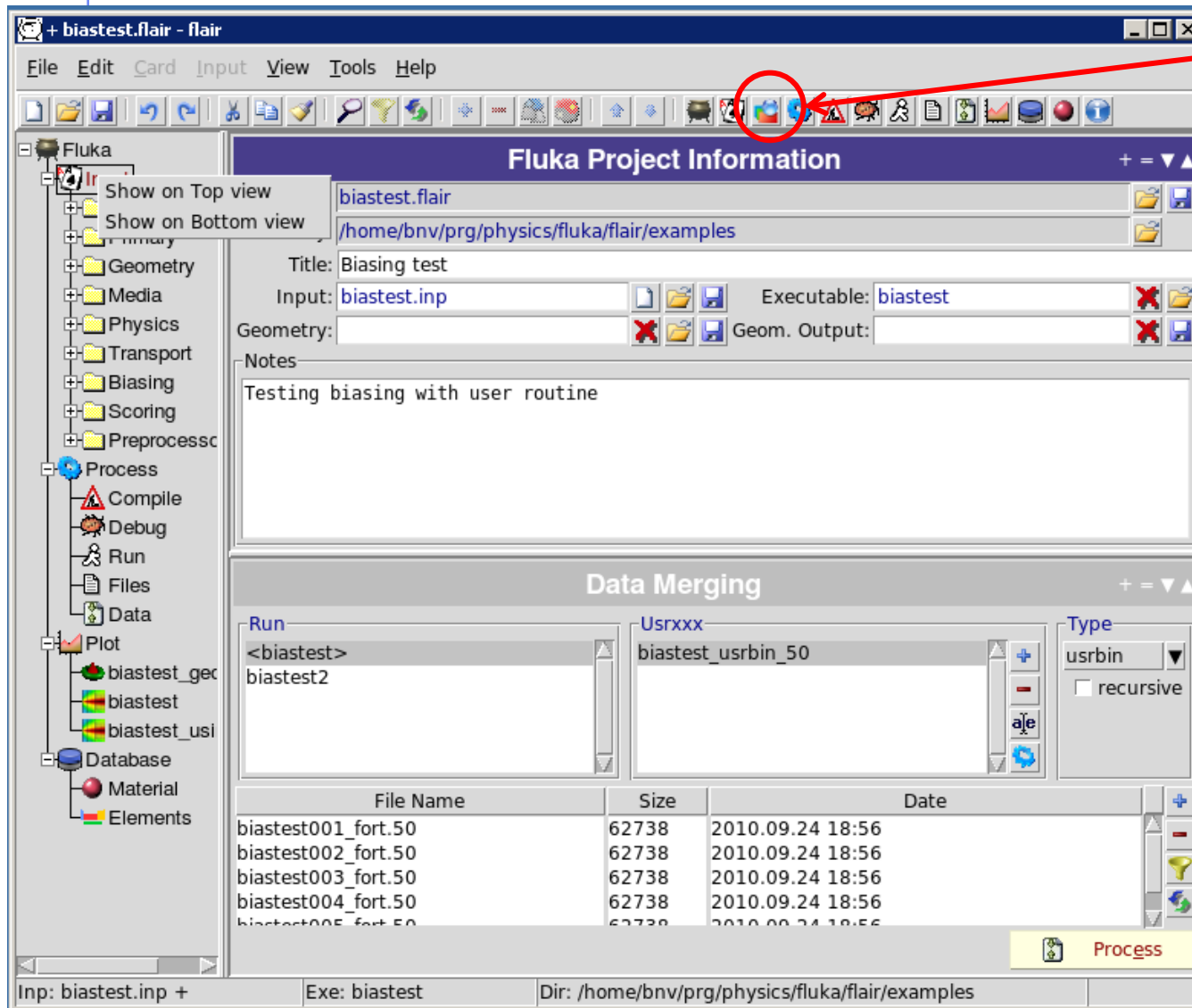




Flair – Geometry Editor – Part I

Beginners' FLUKA Course

Starting the Geometry Editor



The screenshot shows the Flair software interface. The title bar reads '+ biastest.flair - flair'. The menu bar includes File, Edit, Card, Input, View, Tools, and Help. The toolbar contains various icons, with the Geometry Editor icon (a blue cube) circled in red. A red arrow points from this icon to the text on the right. The left sidebar shows a tree view of the project structure, including folders like Geometry, Media, Physics, Transport, Biasing, Scoring, Preprocess, Process, Compile, Debug, Run, Files, Data, Plot, Database, Material, and Elements. The main window is divided into several panels: 'Fluka Project Information' (Title: Biasting test, Input: biastest.inp, Executable: biastest), 'Data Merging' (Run: <biastest>, biastest2; Usrxxx: biastest_usrbin_50; Type: usrbin), and a table of files. The status bar at the bottom shows 'Inp: biastest.inp +', 'Exe: biastest', and 'Dir: /home/bnv/prg/physics/fluka/flair/examples'.



Click on icon
or from Menu
→ View
→ Geometry Editor
or with
[F4] shortcut

- Either start flair with option -g

Geometry editor

- Working on 2D cross sections of the geometry;
- Interactive visual editing of the geometry in 2D;
- Debugging bodies/regions in a graphical way;
- Fast 3D rendering of the geometry;

Pros

- Fast display of complex geometries;
- Many user-customizable layers;
- Graphical editing of the bodies with snapping mechanism to generate accurate coordinates;
- Visual selection and editing of zones **w/o the need to know the orientation of bodies**;
- Use real curve of bodies with no conversion to vertices/edges;
- Interactive debugging with information of problematic bodies, regions and/or zones;

Cons

- Tricky to orientate in an unknown geometry;
- Difficult to find region using the expression;

Geometry Editor: Interface

Filter

Filtered Objects

Properties & Attributes

The screenshot displays the Geometry Editor interface with the following components:

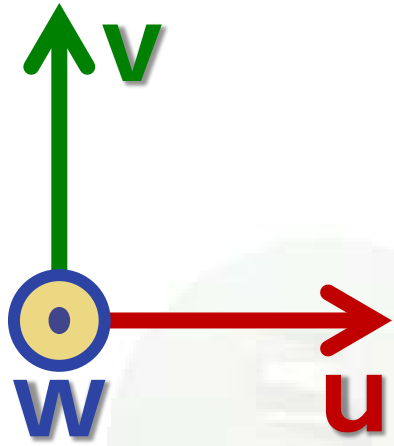
- Menu Bar:** File, Edit, Select, Insert, Tools, View, Help
- Toolbars:** A main toolbar with icons for file operations, editing, and viewing. Specific toolbars for 'Borders', 'Media', 'Lattice', and '3D' are also visible.
- Views:**
 - Borders:** A 2D cross-sectional view of the component, highlighted in red.
 - Media:** A 2D cross-sectional view of the component, highlighted in green.
 - Lattice:** A top-down view of the component, highlighted in blue.
 - 3D:** A 3D perspective view of the component, highlighted in magenta.
- Filter Panel:** A table for filtering objects based on type and value.
- Properties & Attributes Panel:** A table showing the properties and attributes of the selected object.

Type	Value
SPH	BLK
PLA	PL1
PLA	PL2
PLA	NPL3
PLA	NPL4
PLA	NPL5
YZP	NPL6
PLA	NPL7
PLA	NPL8
PLA	NPL9
RPP	BUILD0
RPP	BUILD1
RPP	BLDFL
RCC	AIRCYL
RCC	SHIO
RCC	SHII

Properties	Attributes
name	SHIO
comment	□***** Bi
type	RCC
x	0.0
y	-1443.6
z	0.0
Hx	0.0
Hy	3092.2
Hx	0.0
R	1609.7

Automatically refreshes every time the input is changed

Viewport axes System

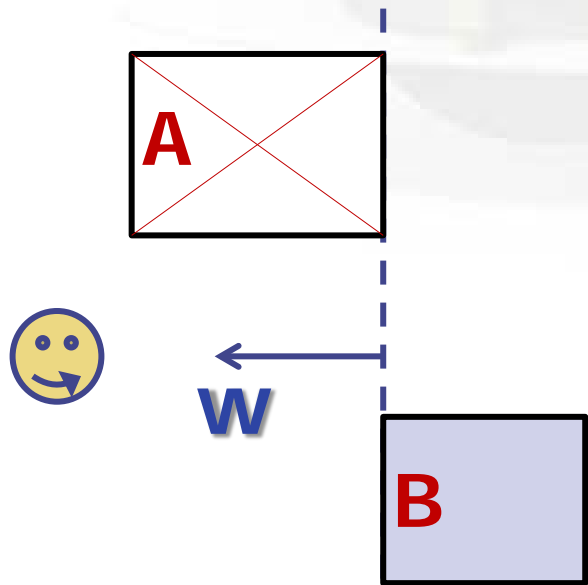


Each viewport is defined by:

- **Origin** center of viewport
- **Basis** relative axes system u, v, w . w is coming out of the screen towards the user
- **Extends** zooming

Note:

- Each viewport is facing towards negative $-w$
- If bodies A, B are touching the viewport like on the plot.
- Only body B will be **visible**



Navigation - Keyboard

- [arrows] pan viewport
- Ctrl + [arrows]
+ [Shift] orbit viewport around **u,v** axes
rotates by 90°
- Page Up/ Page Down pan viewport front/back
- Ctrl + PgUp/PgDn rotate viewport around **w** axis
- = / - zoom in / zoom out
- 0 open projection dialog to set the
o origin/basis/save/recall etc...
- 0 (zero) Center to origin
- 1, 2 **front [X:Y] / back [-X:Y]**
- 3, 4 **left [Z:Y] / right [-Z:Y]**
- 5, 6 **top [Z:X] / bottom [-Z:X]**

*Assuming: Z = direction of the beam (horizontal)
X = horizontal
Y = vertical*

Navigation – Mouse [1/2]

With the **left** mouse button:

1. Select the appropriate action pan/orbit/zoom with:
 - i. Menu → Tools
 - ii. Toolbar
 - iii. Keyboard shortcut
2. Click and drag the desired viewport

	function	key	description
	Pan	x	Pan viewport
	Orbit	t	Orbit viewport using a virtual t trackball
	Zoom	z	Drag area to zoom In ([Ctrl] to zoom out)
		Shift-Z	Zoom viewport on selected items
		Alt-Left	Go to previous in history projection
		Alt-Right	Go to next in history projection

Navigation – Mouse [2/2]

With the **middle** mouse button

- **alone** Pan/Move viewport
- **Ctrl** orbit projection using a virtual trackball
- **Ctrl-Middle-Shift** orbit projection using a virtual trackball with steps of 15 degrees
- **Shift** select rectangle region and zoom into
- **Shift-Middle-Ctrl** select rectangle region and zoom out
- **Wheel (if any)** zoom in/zoom out
 - **Ctrl-Wheel** pan/move forward or backward
 - **Ctrl-Shift-Wheel** smoother pan/move forward/backward

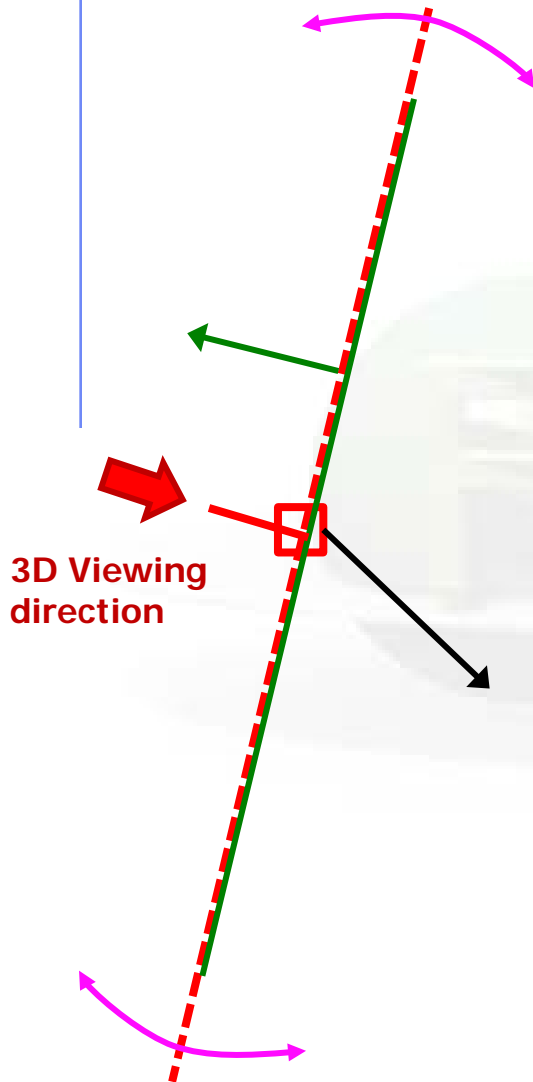



When laptop mode is enabled in the Preferences/Geometry then the middle and right buttons are swapped

Navigation – Viewport lines [1/2]

Description:

- Dashed lines represent other viewports (the intersection of other viewports with the current one);
- The center is represented with a square;
- Viewing direction w is indicated by a short line;
- When another viewport is outside the view window, the viewport-line will be displayed on the closest edge;




Actions: Select  + left mouse button

- Drag the center square to reposition the viewport
- Drag the line close to the center to reposition the viewport along the vertical w axis
- Drag the extremities to rotate it

Navigation – Viewport lines [2/2]

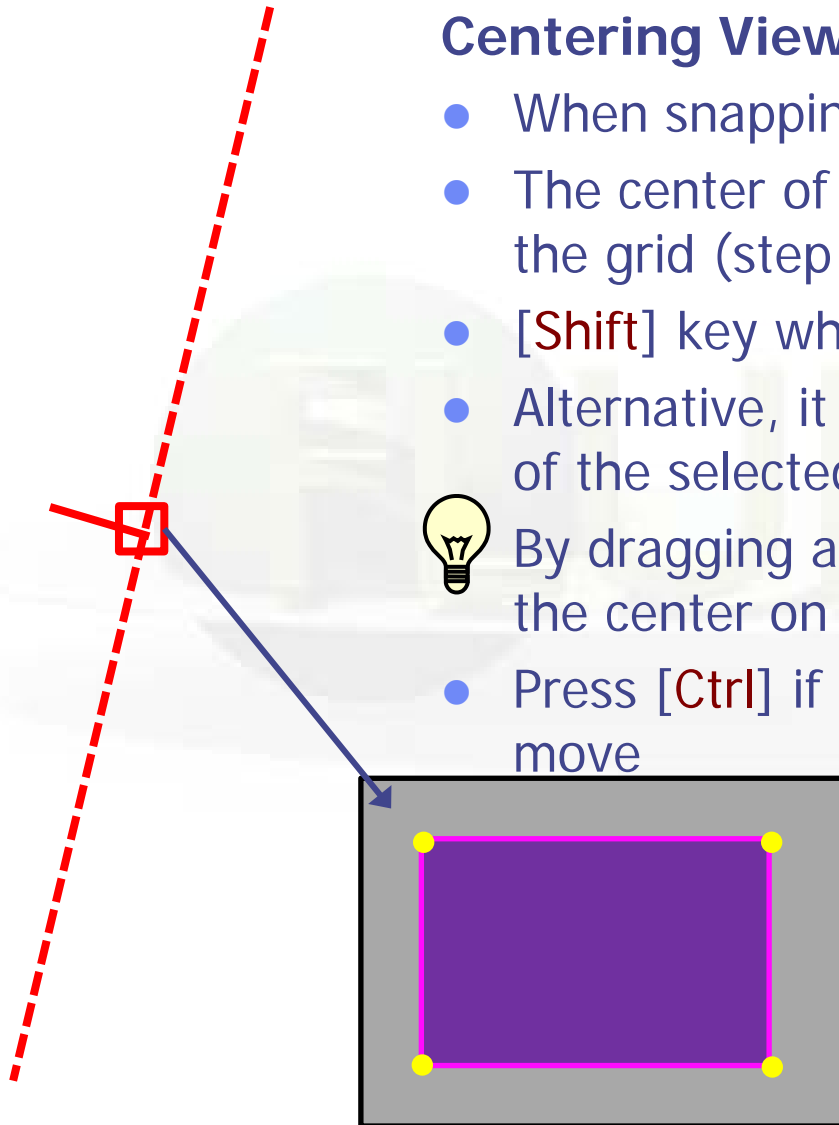
Centering Viewports

- When snapping to grid  is activated
- The center of the viewport will be aligned to the grid (step of 1/10 of the main grid)
- **[Shift]** key while toggle the snapping action;
- Alternative, it can be centered on the vertices of the selected bodies;




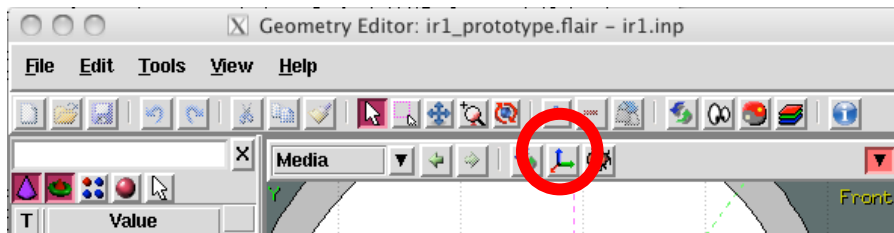
By dragging a viewport center it always moves the center on the current viewing plane.

- Press **[Ctrl]** if you want to have a relative move



Navigation – Projection dialog

With the projection [o]  button you can change, move, shift, rotate, save and reload the projection of a viewport



Shift the coordinate system

Origin	Move	Basis	Euler	Rotate
Δu :				
Δv :				
Δw :				
<input type="button" value="Ok"/> <input type="button" value="Apply"/> <input type="button" value="Cancel"/>				

Set the **o** origin of the viewport

Origin	Move	Basis	Euler	Rotate
x:	0			
y:	0			
z:	13000			
<input type="button" value="Ok"/> <input type="button" value="Apply"/> <input type="button" value="Cancel"/>				

Change the reference axis

Origin	Move	Basis	Euler	Rotate
u:	1.0	0.0	0.0	
v:	0.0	1.0	0.0	
<input type="button" value="x-y"/> <input type="button" value="x-z"/> <input type="button" value="y-z"/> <input type="button" value="swap"/> <input type="button" value="-u"/> <input type="button" value="-v"/> <input type="button" value="norm"/>				
<input type="button" value="Ok"/> <input type="button" value="Apply"/> <input type="button" value="Cancel"/>				

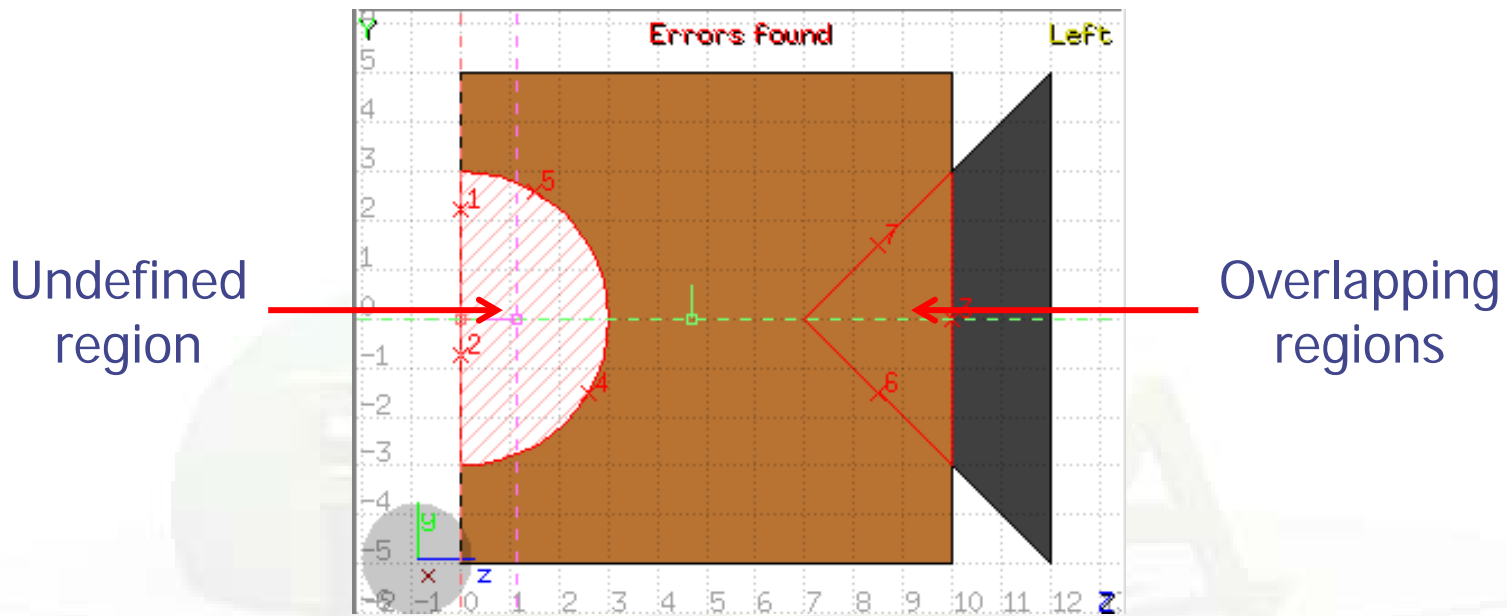
Rotate around the Cartesian axis

Origin	Move	Basis	Euler	Rotate
Rx:	0			
Ry:	-0			
Rz:	0			
<input type="button" value="Ok"/> <input type="button" value="Apply"/> <input type="button" value="Cancel"/>				


Rotate around the (u,v,w) axis

Origin	Move	Basis	Euler	Rotate
Ru:				
Rv:				
Rw:				
<input type="button" value="Ok"/> <input type="button" value="Apply"/> <input type="button" value="Cancel"/>				

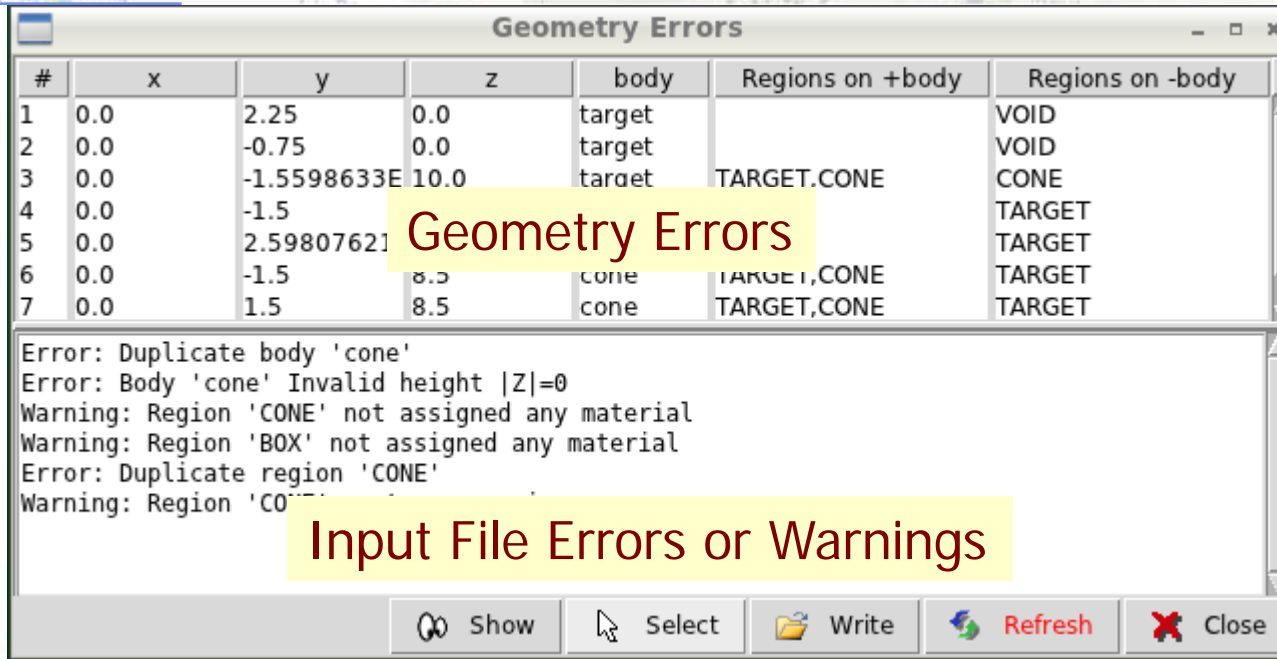
Debugging Geometry Errors [1/2]



Errors found notifies that are errors in the geometry (on the current projection):

- The areas affected by the errors are outlined with a **Red** stroke:
 - Areas filled with a full color correspond to overlapping regions;
 - Areas filled with red lines correspond to a missing region definition;
 - Body segments that are involved in the errors are numbered;
- Clicking the  icon [Ctrl-g] displays the dialog with the errors.
- Touching surfaces are checked against **10** significant digits
- Non-strictly geometrical errors (i.e. missing Material Assignment to a region, non recognized cards) are also notified;

Debugging Geometry Errors [2/2]



#	x	y	z	body	Regions on +body	Regions on -body
1	0.0	2.25	0.0	target		VOID
2	0.0	-0.75	0.0	target		VOID
3	0.0	-1.5598633E	10.0	target	TARGET,CONE	CONE
4	0.0	-1.5				TARGET
5	0.0	2.59807621				TARGET
6	0.0	-1.5	8.5	cone	TARGET,CONE	TARGET
7	0.0	1.5	8.5	cone	TARGET,CONE	TARGET

Error: Duplicate body 'cone'
Error: Body 'cone' Invalid height |Z|=0
Warning: Region 'CONE' not assigned any material
Warning: Region 'BOX' not assigned any material
Error: Duplicate region 'CONE'
Warning: Region 'CO'

Input File Errors or Warnings

- x, y, z** Coordinates of the error (on the surface of **body**)
- body** Body with the **x,y,z** point on surface generating the error
- +body** Regions found on the **+** side of the **body**.
Regions where the body should be **subtracted** to remove the error
- body** Regions found on the **-** side of the **body**.
Regions that the **body** should be **intersected** to remove the error
- +/-** are defined according to the normal on the surface, **+** refers to outside, **-** to inside