



Flair - Geoviewer

Beginners' FLUKA Course



Geometry viewer2D

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

Pros

- Fast display of complex geometries;
- Visual selection and editing of zones;
- Use real curve of bodies with no conversion to vertices/edges;
- Interactive debugging with information of problematic body regions and zones;

Cons

- Interactive editing of the geometry still to be implemented;
- Tricky to orientate in an unknown geometry.

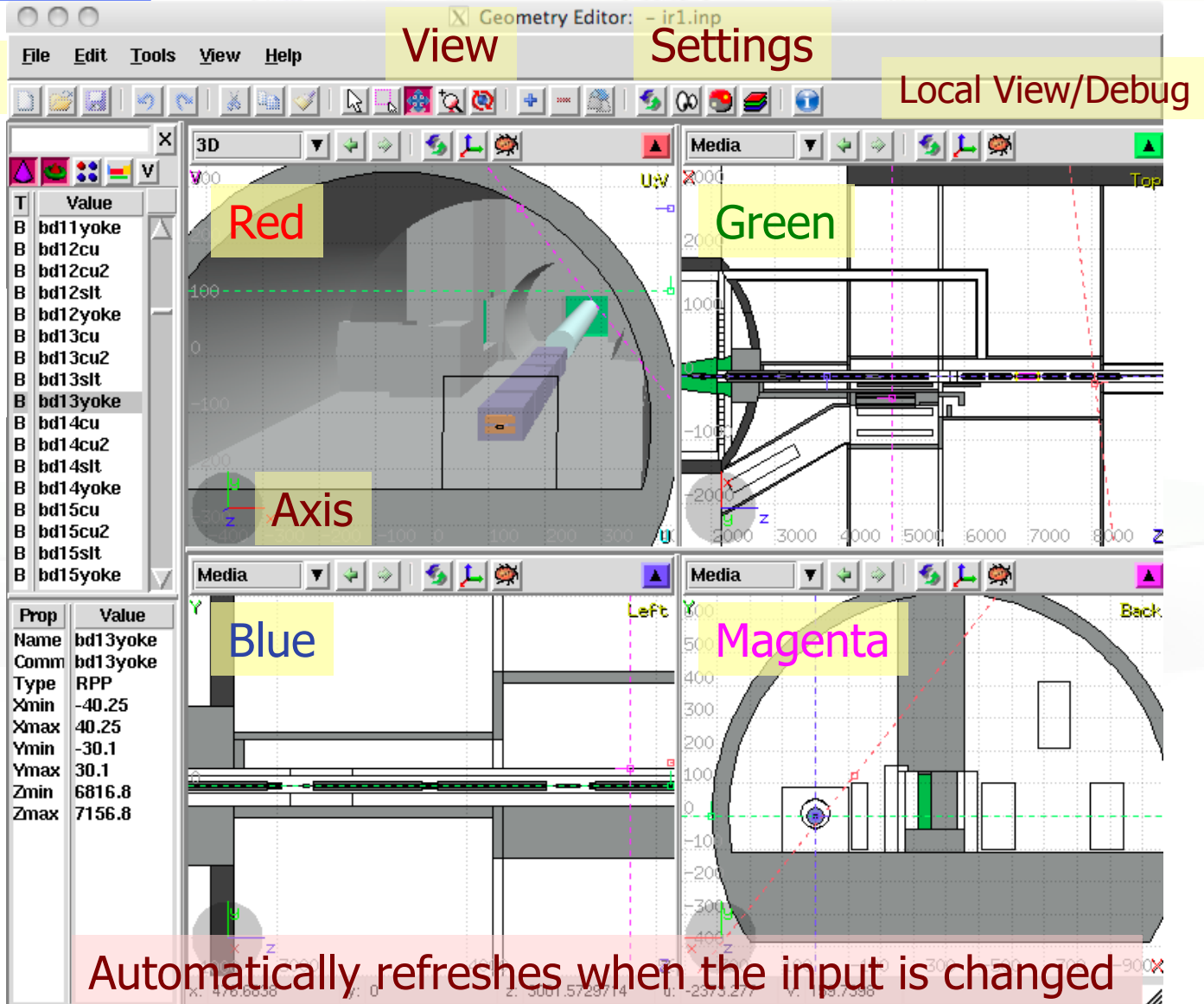
Geometry Editor: Interface

Tools

Filter

Filtered Objects

Properties



Keyboard shortcuts

General:

- **Ctrl** “controls” or changes the action
- **Shift** aligns to grid
- **Escape** cancels the active action
- **SpaceBar** pop-up menu
- **[Arrows]** move viewport
- **Ctrl + [Arrows]** rotate viewport
- **Page Up/ Page Down** move viewport cutting plane
- **= / -** zoom in/ zoom out
- **1 / 2** set viewport to **front / back** view
- **3 / 4** set viewport to **left / right** view
- **5 / 6** set viewport to **top / bottom** view
- **Ctrl + a** select all bodies
- **Ctrl + g** disable/enable grid
- **Ctrl + w** quit Geoviewer













Mouse / Keyboard shortcuts

Mouse:

- **Left** button: User selectable action from the tools
- **Middle** button (or Left+Right if 3rd-button emulation is enabled):
 - **Default** Pan/Move viewport
 - **Shift** select rectangle region and zoom into
 - **Shift-MB-Ctrl** select rectangle region and zoom out
 - **Ctrl** rotate projection using a virtual trackball
 - **Shift-Ctrl-MB** rotate projection using a virtual trackball with steps of 15 degrees
- **Right** button pop-up menu
- **Wheel** (if any) zoom in/zoom out

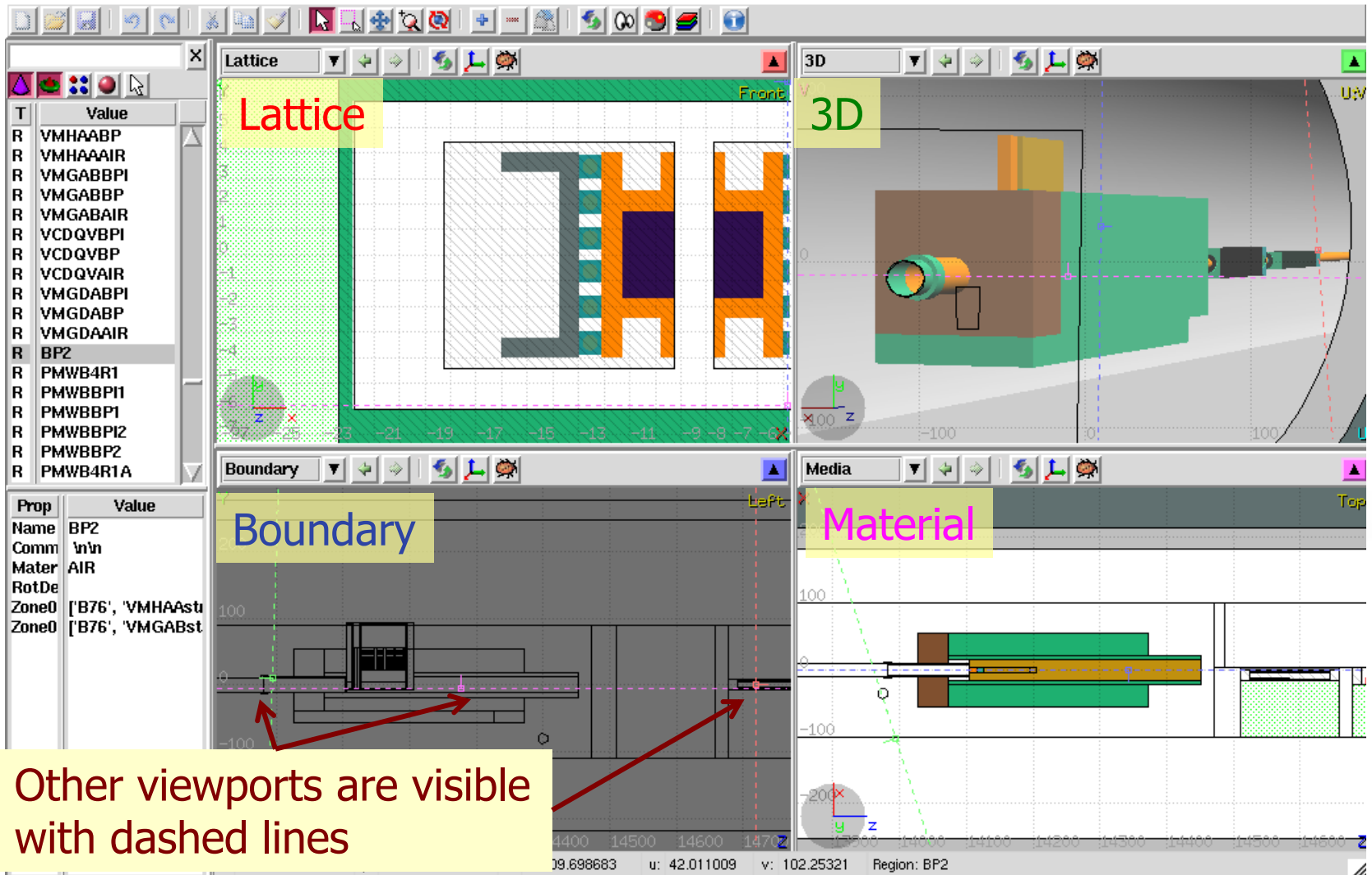
 When laptop mode is enabled in the Preferences then the middle and right buttons are swapped

Iconbar and keyboard shortcuts

	function	key	
	Select	h	bodies, regions or modify viewports
	Region select	Shift + s	Select the bodies in a certain region
	Pan	x	Move viewport
	Zoom In/Out	z	Click Zoom (x2)
		Ctrl + z	Zoom out (x2)
		z + select	Select and zoom region
	Rotate	t	Rotate viewport
	Show zone	d	Show zone
	Refresh	Ctrl + r	Refresh all viewport
	Change layout	v	Change layout of viewport
	Change view	Shift + z	Change view mode in all viewports
	Layers	Ctrl + l	Configure the view mode (Layers)
	Axis		Origin and projection setup
	Errors		Show error in geometry

The Viewports

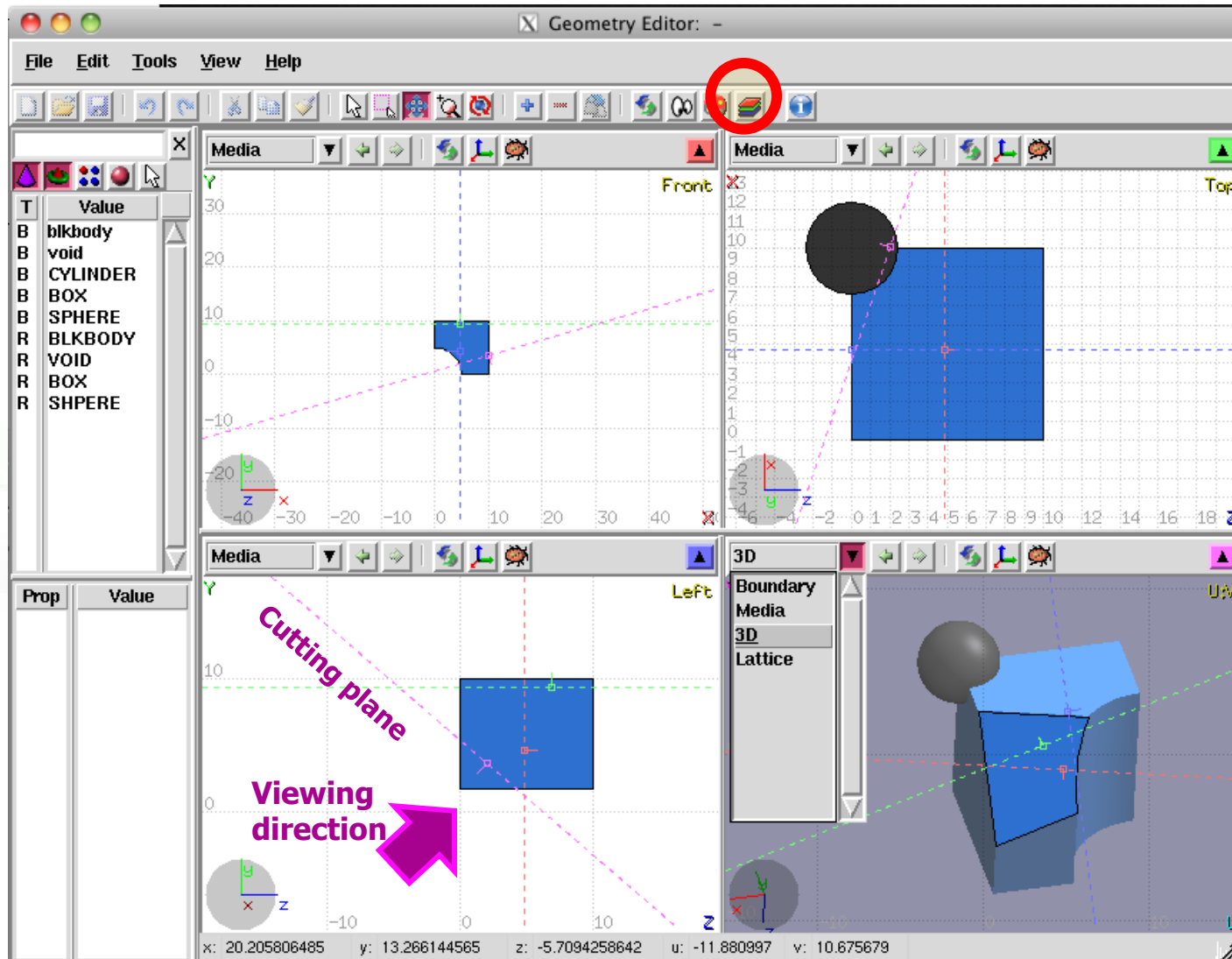
4 predefined geometry Layers: **Boundary**, **Media**, **Lattice** and **3D**



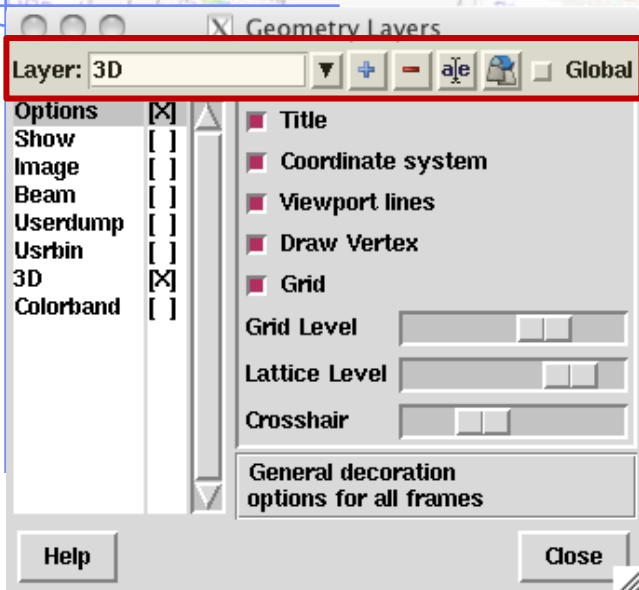
Other viewports are visible with dashed lines

Geometry Layers [1/4]

Custom Layers can be specified in the "Configure Layer menu" ()



Geometry Layers [2/4]

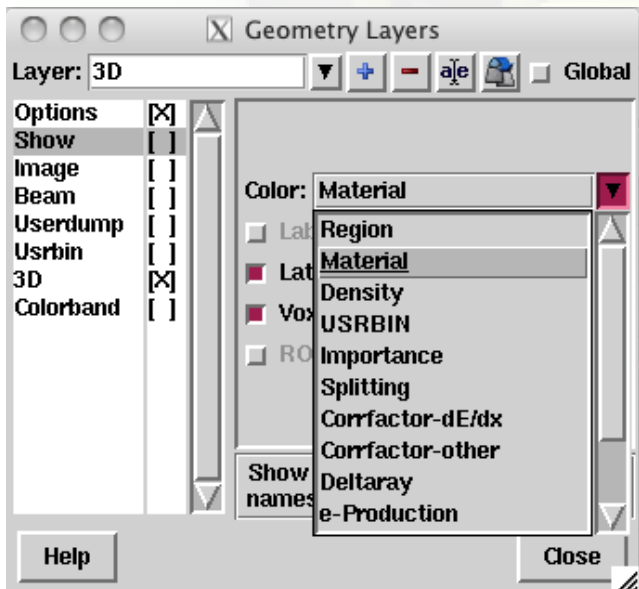


Toolbar:

- **Add/delete/rename/clone layers.**

Options:

- **Enable/Disable:** Title, Coordinate system, Viewport lines, Vertexes and Grid;
- **Adjust:**
 - **Grid level** (set gridline intensity);
 - **Lattice level** (set lattice hash line intensity);
 - **Crosshair** (dimension of the crosshair in the center of the project).



Show:

- **Enable/Disable:** Lattice and Voxel;
- **Associate Colors to:** Regions, Materials, Density, USRBIN (no yet supported), Importance (Bias), etc...

Geometry Layers [3/4]

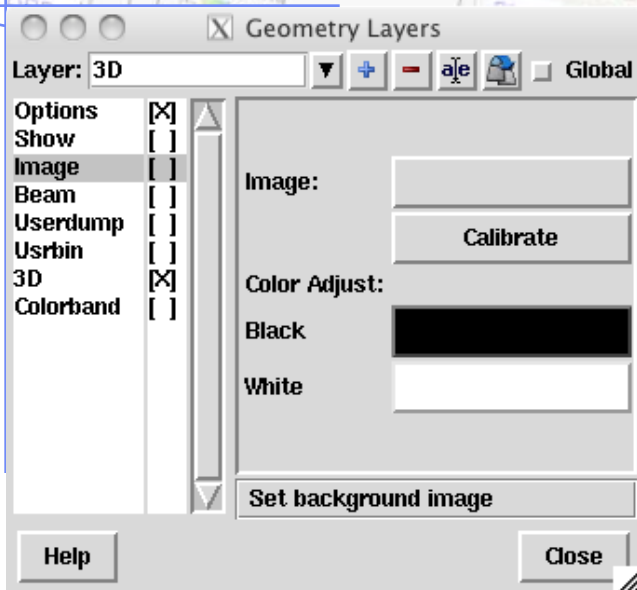
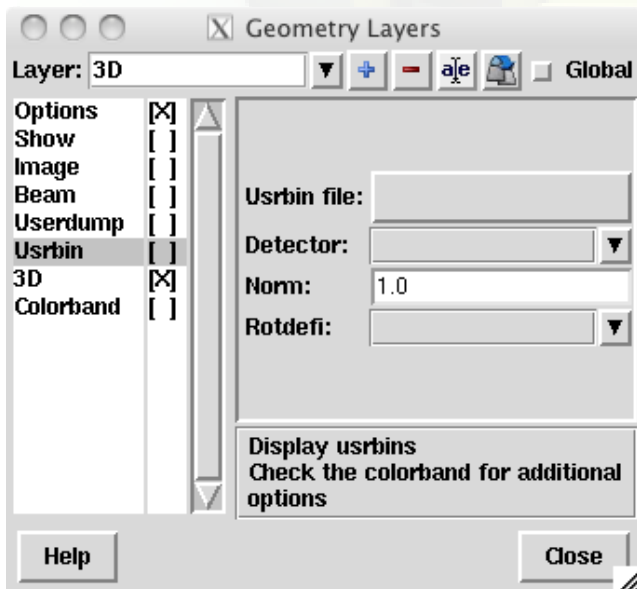


Image: set a background image to the geometry (i.e. a CAD-drawing);

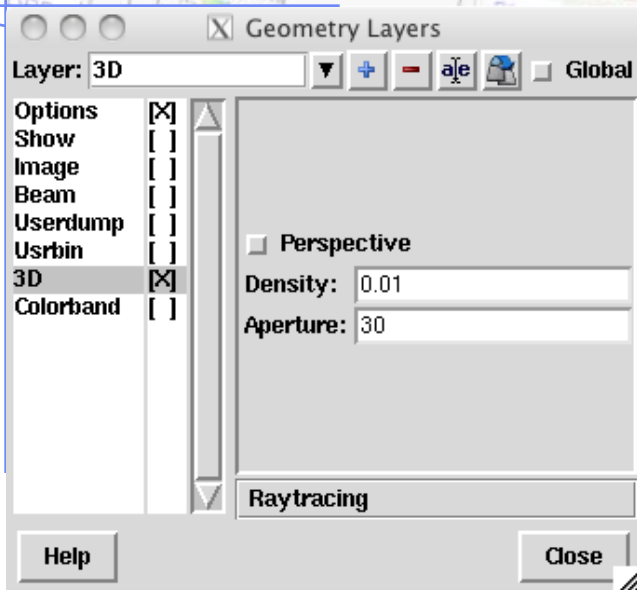
- **Image**: load an image file (.png, .gif or .jpg);
- **Calibrate**: calibrate the image. Define a set of points (min. 3) on the image and specify their coordinate;
- **Color Adjust**: readjust the **black** and **white** colors of the loaded image.



USRBIN:

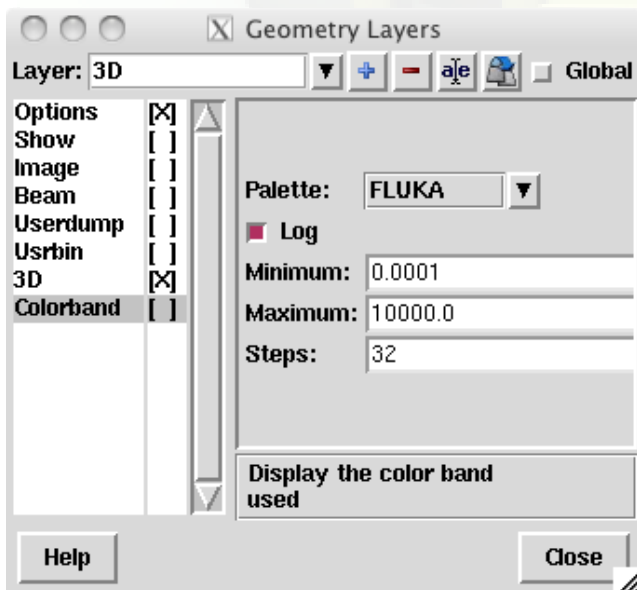
- Load **USRBIN file** (see SCORING lecture);
- Select a **detector** (or USRBIN) among the ones present in the file;
- **Normalization** constant;
- Associate a **ROT-DEFI** transformation;

Geometry Layers [4/4]



3D: enable 3D rendering


- **Enable/Disable Perspective**;
- Set transparency threshold **density**;
- Set camera **aperture** angle.

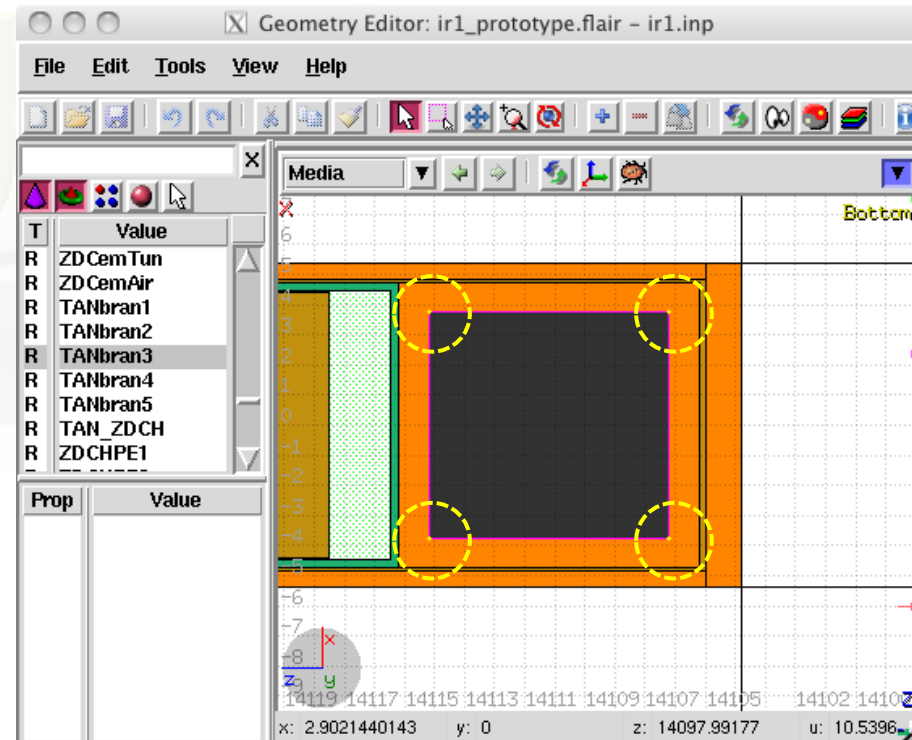


Colorband: enable/set color band properties

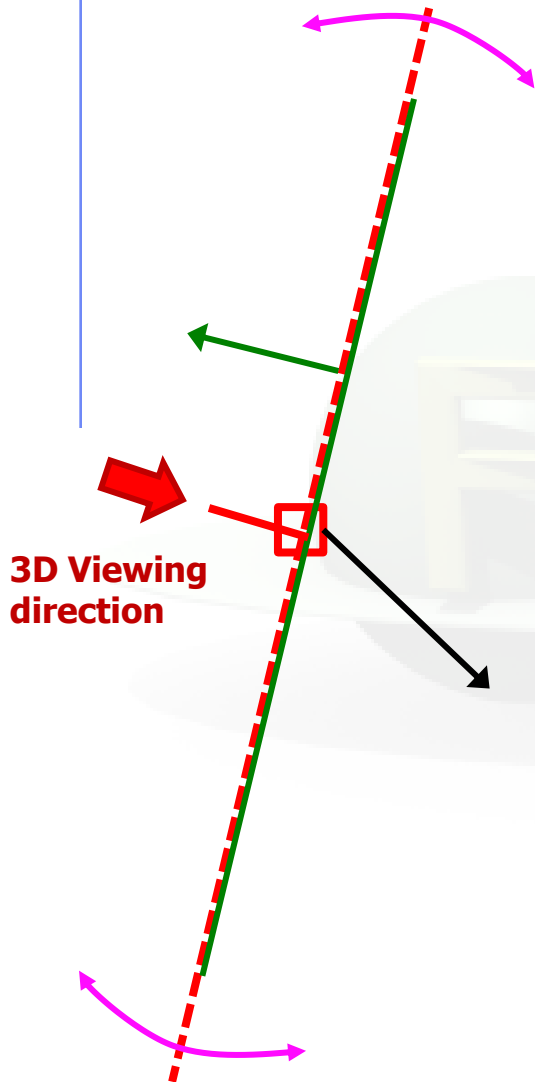
- Change the default color **Palette**;
- **Enable/Disable Log** scale;
- **Set: Maximum, Minimum** and color **steps**.

Object selection

- Bodies or regions can be selected by the action  + left mouse button on the viewport or on the object list in the left bar;
- Multiple bodies/regions can be selected by pressing the **Ctrl** key while clicking with the mouse;
- Bodies and regions can be selected at the same time;
- The selected bodies are:
 - outlined in **magenta** and **yellow** dots appear on their vertexes (viewports);
 - highlighted in grey into the object list in the left bar;
- The selected regions are shaded.



Manipulating Viewport [1/4]



Description:

- Dashed lines represent viewports;
- Center is represented with a square;
- Viewing direction is indicated by a short line;
- When the other-viewport is outside the view window, the viewport-line will be displayed on the closest edge;

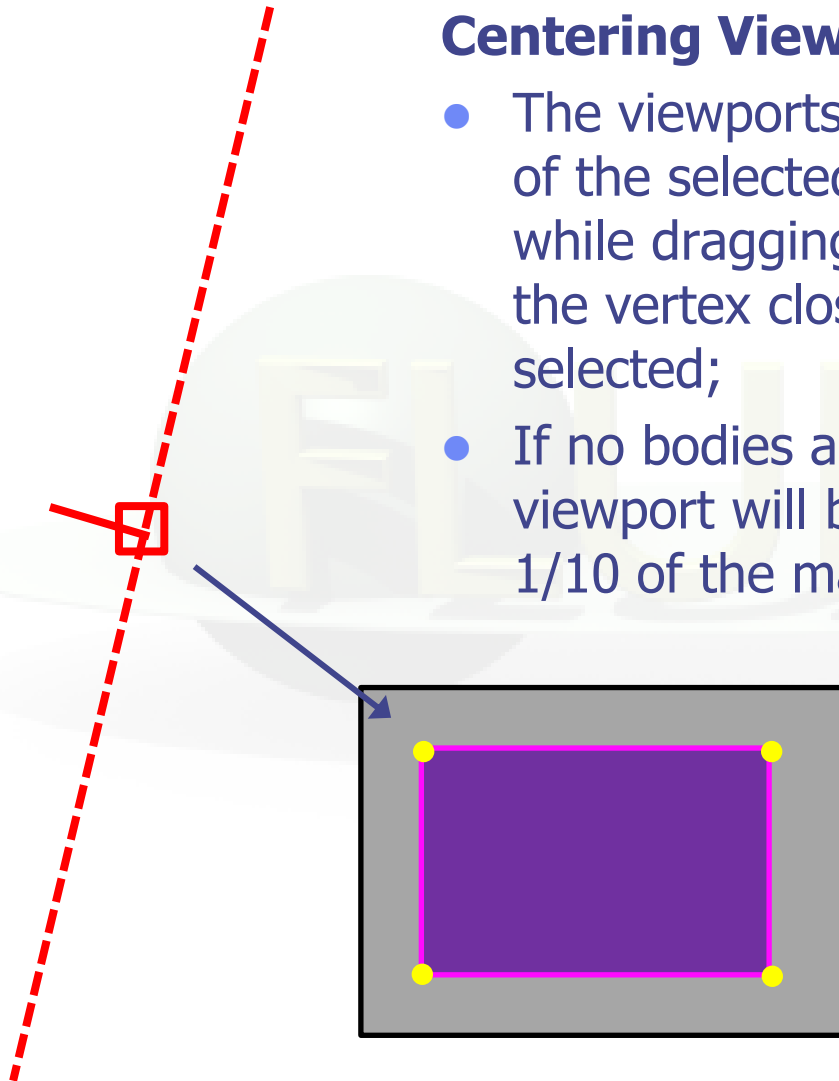
Actions: Select  + left mouse button

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

Manipulating Viewport [2/4]

Centering Viewports

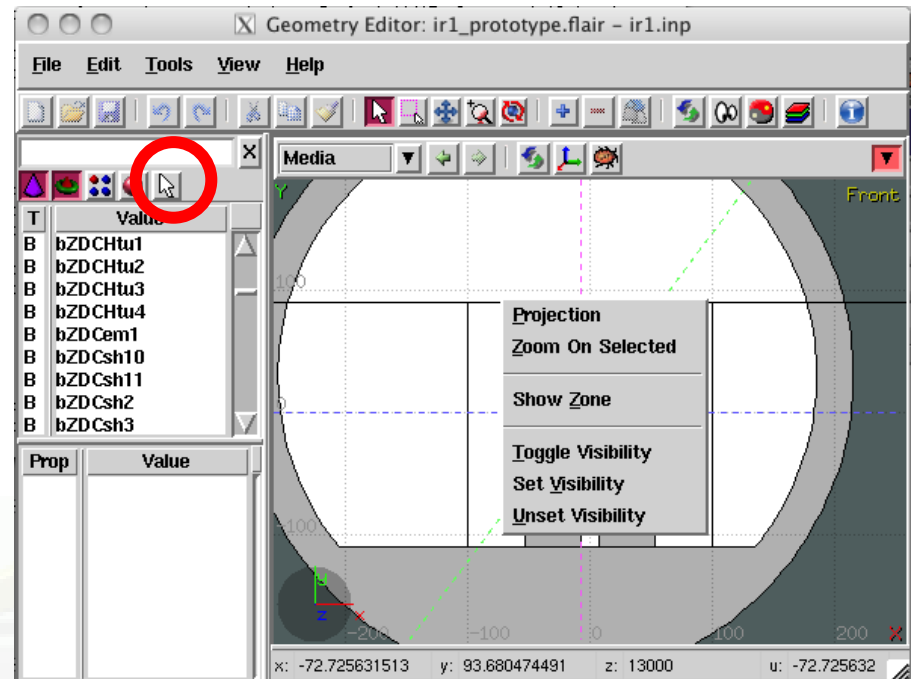
- The viewports can be centered on the vertexes of the selected bodies by pressing the **shift** key while dragging the viewport on the screen and the vertex closer to the mouse pointer will be selected;
- If no bodies are selected the center of the viewport will be aligned to the grid (step of 1/10 of the main grid).



Manipulating Viewport [3/4]

Pop-up menu options:

- **Projection:** Modify the position of the viewport
- **Zoom On Selected** (object);
- **Show Zone:** show the zone composition at the mouse pointer location;
- **Toggle/Set/Unset Visibility:** The bodies which have the visibility option set are outlined in **violet** and their vertices are always visible even if the object is not selected.



Manipulating Viewport [4/4]

Pop-up menu options: Projection

Set the origin of the viewport

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

Shift the coordinate system

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

Change the reference axis (basis vectors)

Origin	Move	Basis	Euler	Rotate
u:	<input type="text" value="1.0"/>	<input type="text" value="0.0"/>	<input type="text" value="0.0"/>	
v:	<input type="text" value="0.0"/>	<input type="text" value="1.0"/>	<input type="text" value="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:	<input type="text" value="0"/>			
Ry:	<input type="text" value="-0"/>			
Rz:	<input type="text" value="0"/>			
<input type="button" value="Ok"/> <input type="button" value="Apply"/> <input type="button" value="Cancel"/>				

Rotate around the (u,v,w) axis

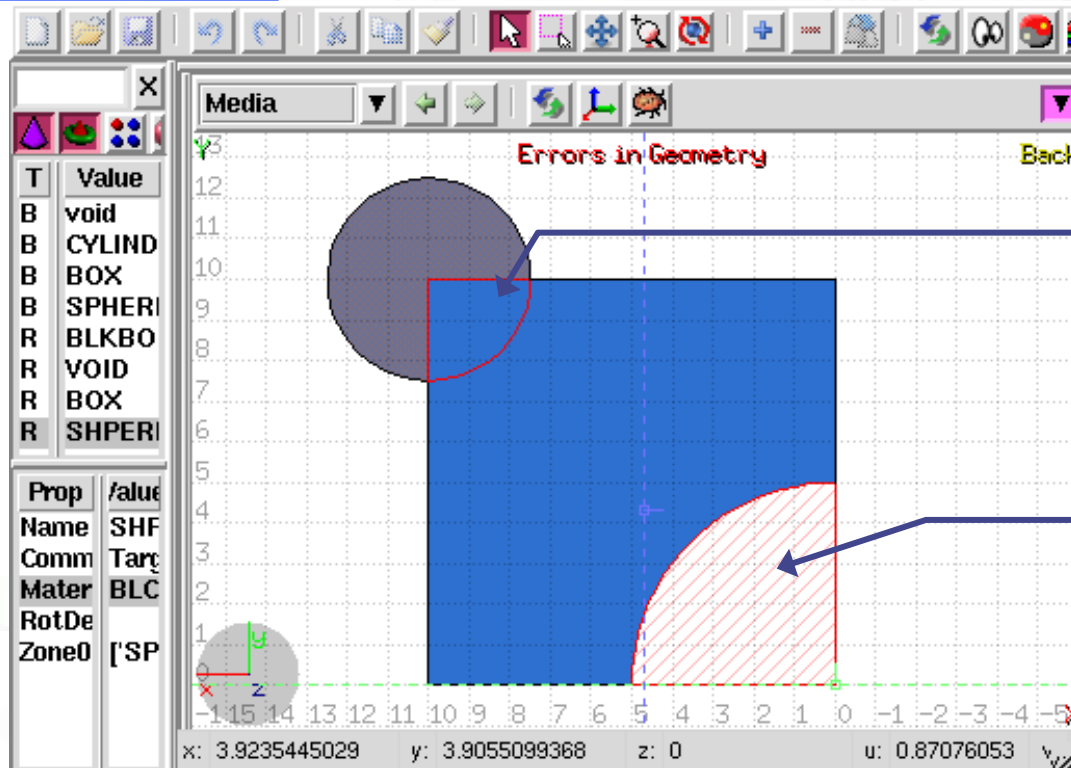
Origin	Move	Basis	Euler	Rotate
Ru:	<input type="text"/>			
Rv:	<input type="text"/>			
Rw:	<input type="text"/>			
<input type="button" value="Ok"/> <input type="button" value="Apply"/> <input type="button" value="Cancel"/>				

Debugging Geometry Errors [1/3]



- A warning window notifies that are errors in the geometry;
- Non-strictly geometrical errors (i.e. missing Material Assignment to a region, non recognized cards) are also notified;


Debugging Geometry Errors [2/3]



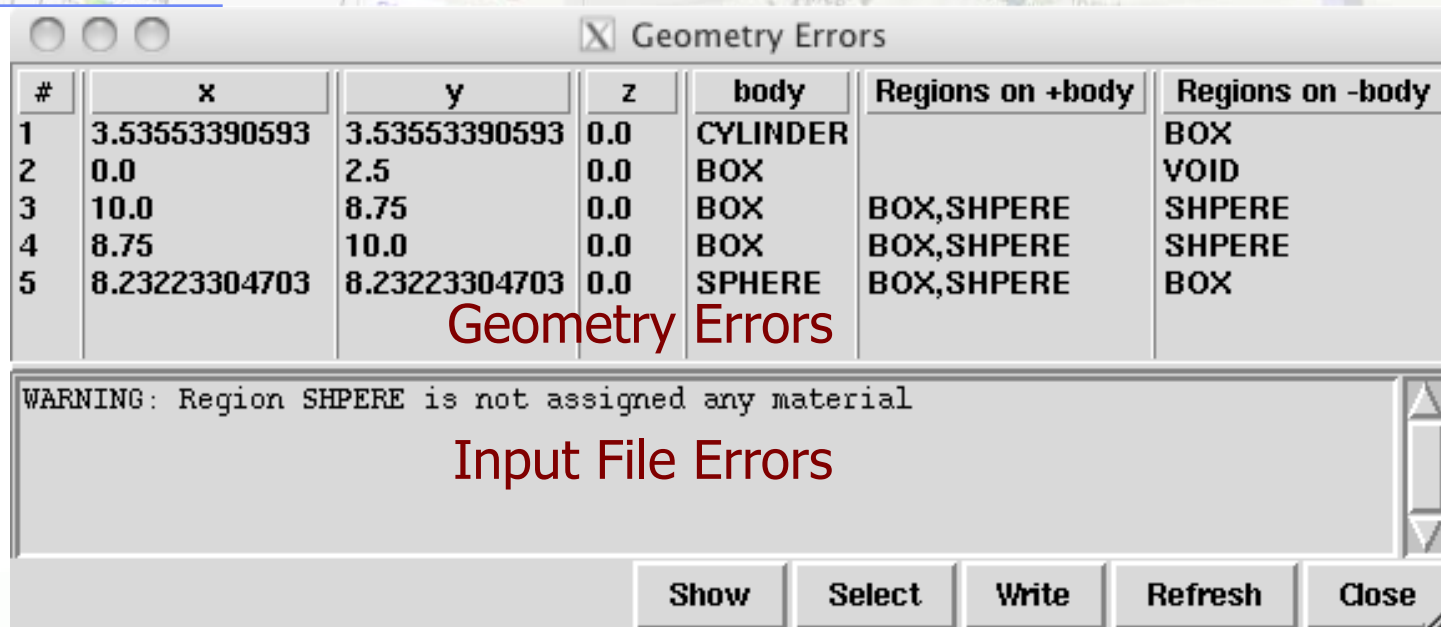
Overlapping regions

Missing region definition

Errors in Geometry notifies that are errors in the geometry:

- 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 line correspond to a missing region definition;
- Clicking the  icon displays the dialog with the errors.
- Touching surfaces are checked against 10 significant digits

Debugging Geometry Errors [3/3]



The screenshot shows a window titled 'Geometry Errors' with a table of error data and a warning message below it.

#	x	y	z	body	Regions on +body	Regions on -body
1	3.53553390593	3.53553390593	0.0	CYLINDER		BOX
2	0.0	2.5	0.0	BOX		VOID
3	10.0	8.75	0.0	BOX	BOX,SHPERE	SHPERE
4	8.75	10.0	0.0	BOX	BOX,SHPERE	SHPERE
5	8.23223304703	8.23223304703	0.0	SPHERE	BOX,SHPERE	BOX

WARNING: Region SHPERE is not assigned any material

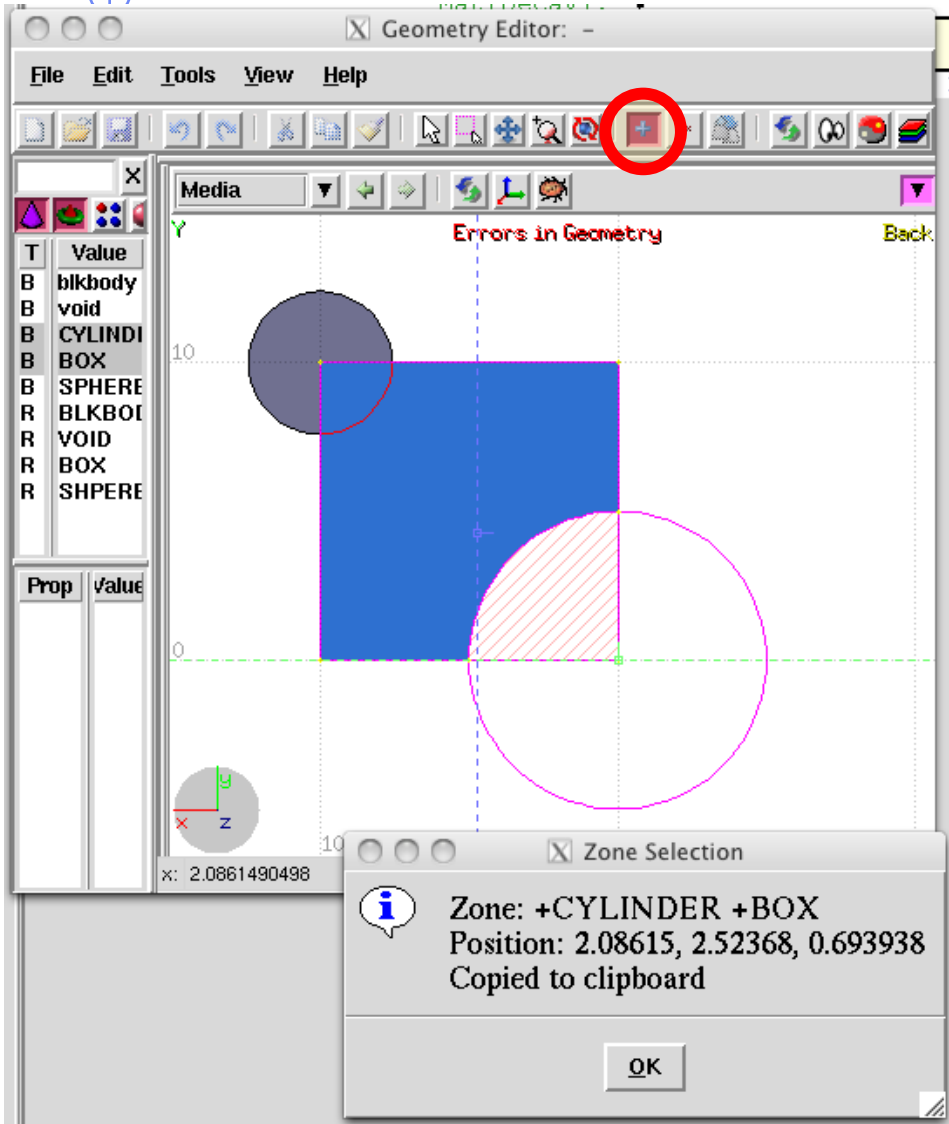
Buttons: Show, Select, Write, Refresh, Close

Geometry Errors

Input File Errors

- 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 that are on the + side of the **body**.
Regions where the body should be **subtracted** to remove the error
- body** Regions that are 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

Zone information



A zone can be identified by:

- selecting the surrounding bodies;
- Selecting the *show zone* mode (click **d** or on the button);
- Clicking on the specified area.

The zone composition is also copied in the clipboard.

At the moment the program has only viewing capabilities and the region has to be fixed manually, but we plan a future editing mode where the error can be directly be fixed in **Geoviewer**.