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Chapter Overview

This chapter describes the batch and interactive command options available for PolyView. Command line data and control parameters are presented, as well as pop-up menu and keyboard options.

Command Line Parameters

This section describes the command line parameters available to you when starting up PolyView. Command line parameters are options provided to the program, typically prefixed by a hyphen and followed by other information, when the command is executed.

For example, in the following entry:

```
polyview -hdf demo.hdf -scalar random -fly demo.fly
```

the strings `-hdf`, `-scalar`, and `-fly` are the parameters that control the execution of the program.

This section begins by providing a list of all the parameters available to the user, then provides more detail about each of them, drawing a distinction between *data* and *control* parameters .

Usage

Typing **polyview** without any arguments lists the legal parameters available to the user, as shown below.

```
usage:   polyview
         -hdf <string>
         [-palette <string>]
         [-ris8out <string>]
         [-group <string>]
         [-fly <string>]
```

```
[-px <string>]
[-py <string>]
[-pz <string>]
[-connect <string>]
[-scalar <string>]
[-from <float> <float> <float>]
[-axes]
[-box]
[-constant]
[-labels]
[-points]
[-lines]
[-polygons]
[-at_point]
```

The `-hdf` parameter is the only mandatory option. All other data and control parameters are optional and have reasonable defaults. Optional parameters are surrounded by square brackets.

Parameters may be specified in any reasonable order, as long as you provide the proper arguments. In the usage listing above, each argument-type name is surrounded by angle brackets.

Data Parameters

This section describes the command line parameters that determine which files, vgroups, and vdatas are used as sources of *data* for the PolyView session.

HDF File

-hdf *filename*
The *-hdf* parameter specifies the name of the file that is to be used for input to the program. The *filename* may be the name of any HDF Vset format file.

NOTE: This parameter is mandatory. If it is not present, PolyView refuses to run.

Group Parameter

-group *groupname*
The *-group* parameter specifies the *groupname* of the vgroup(s) which contain the data you want to view. PolyView scans the vgroup(s) matching the *groupname* for vdatas which you specified using other data command parameters.

The *groupname* may contain an asterisk as a wildcard character, but only at the end of the string. The program reads all vgroups with names that match the *groupname* into memory.

The data in each vgroup is assumed to form one frame in an animation sequence. If PolyView reads in more than one frame, then it can animate the set of frames when you use the Animation submenu.

With a set of animation frames, you might want to specify group names using a wildcard character in the group name parameter at startup. For

example, if the groups are named `group01`, `group02`, and `group03` a good group name might be `group*`.

Each vgroup describes one frame of the animation sequence. Any data missing from a given group (such as vertex or connectivity data) is obtained from the last vgroup that it was present in. This system avoids requiring redundant information.

For example, consider a finite element simulation with constant structural data (vertices and connectivity), but with varying scalar data (compression, temperature, voltage, etc.). All groups would contain their own unique scalar datasets, but only one of them would need to contain a copy of the structural data since it is the same for all frames.

Default: The *groupname* defaults to "*", which tells PolyView to load all of the vgroups in the file.

PX, PY, PZ Parameters

-px *pxname*
-py *pyname*
-pz *pzname*

The *-px, -py, and -pz* parameters specify the names of the x, y, and z coordinate datasets. If datasets do not exit, default float datasets indicate x, y, and z coordinates of image vertices.

Default: The *pxname*, *pyname*, and *pzname* default to `px`, `py`, and `pz`, respectively.

Connect Parameter

-connect *connectname*
The *-connect* parameter specifies the *connectname* of the connectivity dataset.

The integer dataset *connect* specifies connectivity of vertices. Three- and four-vertex polygons are supported as dataset types. A connect dataset named `plist3` is always assumed to be composed of groups of three vertex ids each. All other datasets are assumed to be composed of groups of four vertex ids each. If PolyView doesn't find any connectivity information, it displays the data as a field of points.

Default: The *connectname* defaults to `plist4`.

Defining Polygons

Connectivity information defines polygons. Each polygon is described by the vertex ids of the vertices that comprise it. The vertex ids index into the `px`, `py`, and `pz` datasets to specify the vertex coordinates. The ids are numbered from 1 to n, where n is the number of vertices in this group.

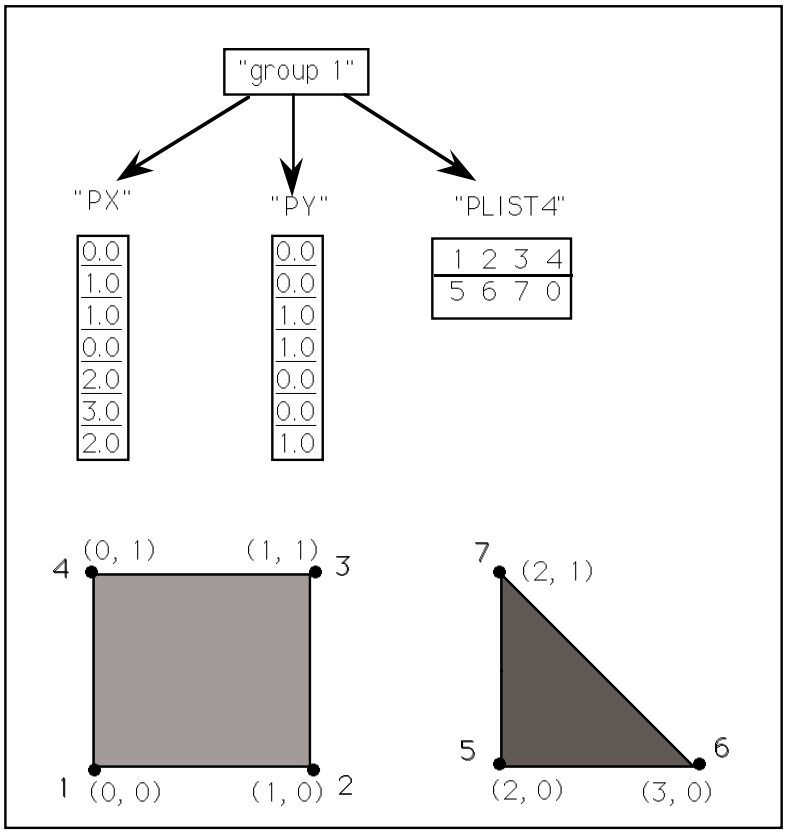
Mixing Polygons

To mix three- and four-vertex polygons in the same dataset, use a four-vertex dataset (i.e., one named something other than `plist3`). In such a scheme, four-vertex polygons are represented as usual. Three-vertex

polygons are composed of the three vertex-ids and a “0” for the last vertex id. The zero indicates a “null” or non-existant vertex.

As an example, consider a square and a triangle (Figure 2.1). The square is composed of four vertices and the triangle of three. The entry in the connect dataset for the square contains all four vertex ids. The entry for the triangle only connects three, followed by a zero.

Figure 2.1 Three- and Four-Vertex Polygons



NOTE: Vertices are numbered starting with 1 (the FORTRAN convention, rather than C’s 0).

Scalar Parameter

-scalar *scalarname*
The *-scalar* parameter specifies the *scalarname* of the scalar value vdata.

The *scalarname* vdata is a float vdata whose values are mapped to the colors used to draw lines and polygons. If the vdata is not found, the foreground color (white) is used for all drawing.

Default: The *scalarname* defaults to `scalar`.

Raw Palette File

-palette *filename*
The *-palette* parameter specifies the *filename* of a raw palette file. PolyView reloads the palette into the program at startup; it can reload a palette at any time when you choose the *from file* option from the *palette* submenu.

If you choose the *from file* menu option without having specified a palette filename on the command line, PolyView prints the following warning message:

```
Please specify palette file on command line using the
'-palette' switch for this option.
```

A *raw palette* file defines a palette of 256 colors in terms of their red, green, and blue components. The color component values are expected to be written in binary format using the C `fwrite()` function or equivalent Fortran command.

Component values are based on the red, green, and blue representation of color, the RGB color model. The values consist of, in order, 256 bytes of red, 256 bytes of green, and 256 bytes of blue. The 256 color palette entries are calculated by combining the *n*th element (red), the (*n*+256)th element (green), and the (*n*+512)th element (blue) to create the *n*th RGB component.

PolyView rereads the raw palette every time you choose the *from file* option from the *palette* menu, located in the Palette window.

The programs uses the 0th color palette entry for the background color and the 255th entry for the foreground color (used for overlays).

All palettes should have colors 0 and 255 mapping to the background and foreground colors (black and white), respectively. The other colors are free to change as necessary.

Default: No default exists.

ris8out File

-ris8out *filename*
The *-ris8out* parameter specifies the *filename* to which PolyView writes the raster images and palettes. Raster images and palettes are written in HDF RIS8 format.

Default: The *filename* defaults to `ris8.hdf`.

Fly File

-fly *filename*
The *-fly* parameter is the *filename* of the fly file PolyView uses when you enter fly-by mode.

To control an automated flight through a dataset, you provide a flight

plan that contains commands that control the camera position (`from point`) and camera focus (`at point`) of a flight.

To print the current camera position and focus, press "p" while in the View window. The string may be copied and incorporated directly into a fly-by file.

Only two basic fly commands are provided for flights in this release. Both commands move the initial point to a new position in a step-by-step fashion.

1. The command `from abs|rel <x> <y> <z>` moves the camera position:

   to (`<x>,<y>,<z>`) if you use `abs`

   or

   to (`<oldx>+<x>`, `<oldy>+<y>`, `<oldz>+<z>`) if you specify `rel`.

2. The command `at abs|rel <x> <y> <z>` moves the camera's focus of attention:

   to (`<x>,<y>,<z>`) if you use `abs`

   or

   to (`<oldx>+<x>`, `<oldy>+<y>`, `<oldz>+<z>`) if you specify `rel`.

Use a semicolon as a comment character. PolyView ignores text that follows a semicolon on a line.

Fly Demo

For a useful example of how the fly file is used, refer to Appendix B, "Example Fly File," to view the documentation for the `demo.fly` file that runs on the demo.hdf file.

Control Parameters

This section describes the command line parameters that determine how PolyView initially displays data.

From

-from *x y z*

The *-from* parameter specifies the initial camera *(x, y, z)* position. Any value in three-space may be used. All three coordinates must be specified.

Default: PolyView positions the camera along the z-axis, above the center point of the data.

Axes

-axes

The *-axes* parameter tells PolyView to draw coordinate axes.

Default: The axes are off.

Box

-box
The *-box* parameter tells PolyView to draw a bounding box.

Default: The box is off.

Constant

-constant
The *-constant* parameter tells PolyView to draw constant shaded polygons.

Default: Polygons are gouraud-shaded.

Labels

-labels
The *-labels* parameter toggles whether labels are displayed when drawing axes or a bounding box.

Default: PolyView draws the labels.

Lines

-lines
The *-lines* parameter tells PolyView to draw data as wireframe.

Default: PolyView draws the polygons.

Points

-points
The *-points* parameter tells PolyView to draw the a point at each polygon vertex, instead of polygons.

Default: PolyView draws the polygons.

Polygons

-polygons
The *-polygons* parameter tells PolyView to draw data as polygons.

Default: PolyView draws the polygons.

At Point

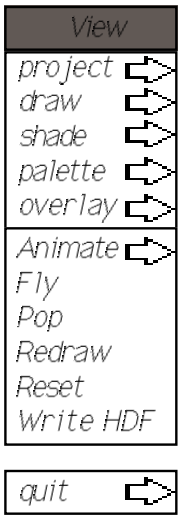
-at_point
The *-at_point* parameter tells PolyView to draw a six-pointed jack at the focus of the camera's attention.

Default: PolyView doesn't display the jack.

View Menu

The *View* menu (Figure 2.2) contains a number of options that allow you to adjust the view of the data interactively.

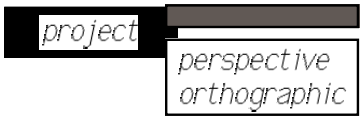
Figure 2.2 View Menu



Projection Submenu

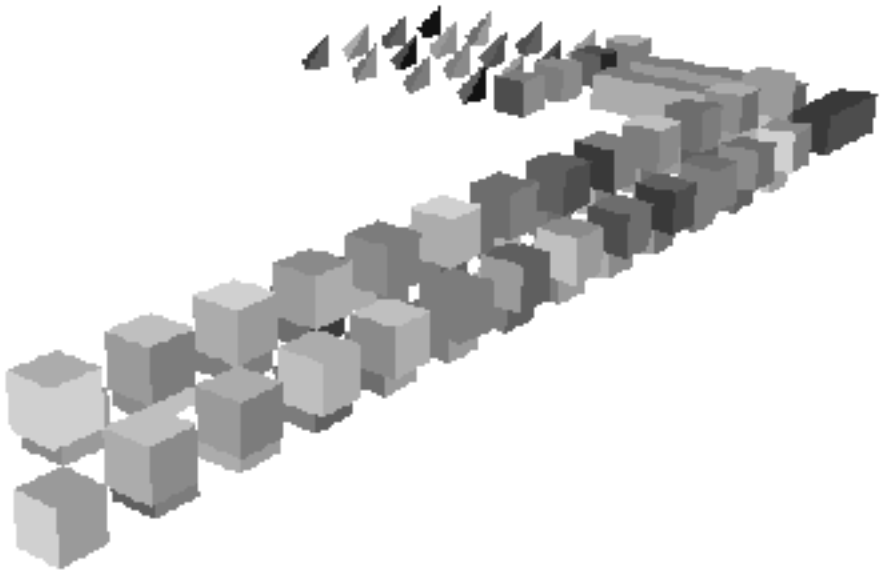
PolyView supports both perspective and orthographic projections. Figure 2.3 displays the *project* submenu and its options.

Figure 2.3 Projections Submenu



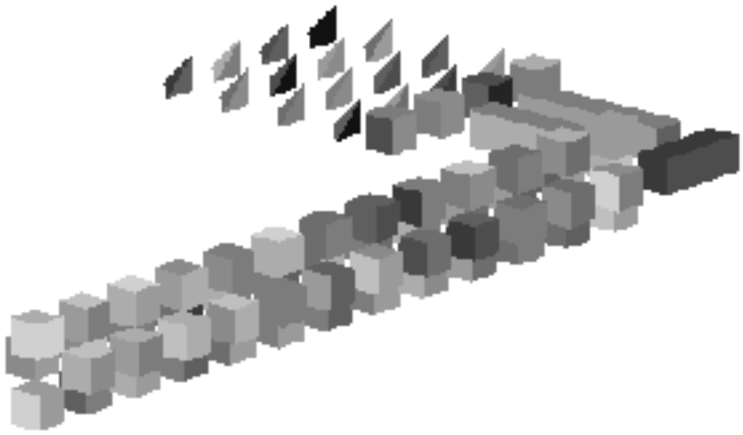
By default, the initial viewpoint is a point in the z direction that is just distant enough so that the entire image is displayed. Figure 2.4 shows a *perspective* projection.

Figure 2.4 Loaded Demo Image



In an *orthographic* projection (Figure 2.5) projecting lines are perpendicular to the plane of projection.

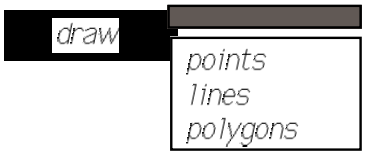
Figure 2.5 Orthographic Projection of Data



Draw Submenu

Features from the *draw* submenu (Figure 2.6) draw data as points, lines, or polygons, depending on the connectivity information available.

Figure 2.6 Draw Submenu



Points and *polygons* use colors if scalar information is available; the *lines* options uses color if it is available, and if you have chosen the gouraud option from the *shade* menu. If the shade option is not chosen, you can view the dataset as white. Use the *lines* option when you just want to study the intersection of the geometry in you image. The polygons option, in the coil image, is the default view. Choose and view these various options from the *draw* submenu.

Shade Submenu

Options in the *shade* submenu (Figure 2.7) color polygons in two different styles: constant or gouraud-shaded. *Constant* shading averages the color of the vertices across the polygon as a solid color. *Gouraud* shading, on the other hand, uses the IRIS's gouraud shading hardware when drawing polygons, resulting in interpolated colors between a polygon's vertices. The data appears smoother and polygonal boundaries are less apparent. Constant shading is useful for making the outline of individual polygons more apparent.

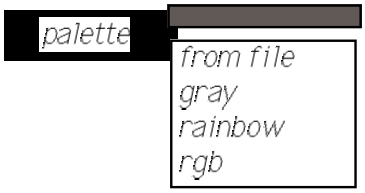
Figure 2.7 Shade Submenu

NOTE: This version of PolyView offers no support for individually colored polygons.

Palette Submenu

The *palette* submenu (Figure 2.8) contains options that allow you to specify a palette or choose from the standard palettes provided. The *palette function* actually maps scalar data to the set of colors, or *palette*, that you've specified.

Figure 2.8 Palette Submenu



Choosing a Standard Palette

You can select a standard palette in one of two ways:

1. Choose a palette from the *palette* submenu located in the View window.

   or

2. Choose a palette from the main menu located in the Palette window. Notice that the current palette is always reflected in the Palette window.

Fiddling with the Palette

PolyView contains a palette feature, *fiddling*, that is found in other NCSA programs, such as NCSA PalEdit, NCSA Image, and NCSA ImageIP.

Use the fiddle option in the following way:

1. Hold down the left or middle mouse button while the cursor is either in the Palette window.

2. Move the mouse left and right to compress and expand the palette, respectively.

3. Move the mouse up and down to shift the colors in the palette.

All user-defined palettes should map 0 and 255 to the background and foreground colors (black and white), respectively. These colors are used for the image background and text.

Overlay Submenu

Features within the *overlay* submenu (Figure 2.9) display useful information on top of the data. The overlays help meshes stand out by showing where their boundaries lie and by providing orientation information.

Select each of the overlay choices to see the effect they have on your image. (Refer to Table 2.1 for a review of the overlay options.) Note that all overlay options toggle off and on.

Figure 2.9 Overlay Submenu

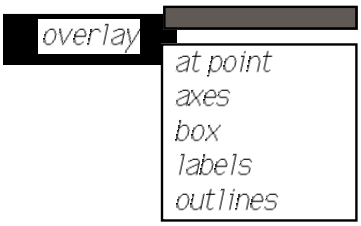


Table 2.1 Overlay Submenu Options

OPTIONS	PURPOSE
at point	displays the at point as a 3Dplus-sign, or

jack, in the center of the image.

axes	draws a set of labeled axes.
box	draws a bounding box.
labels	toggles the visibility of the data.
outlines	displays a grid that outlines the actual data points in the image.

Animate Submenu

A set of vset groups containing time-varying data may be animated. All data—vertex position, connectivity, and scalar values—or any subset of datasets may change in any frame of the sequence.

All animation is cyclic. Backing up past the first frame displays the last frame. Moving forward past the last frame displays the first frame.

Once the groups are loaded, the animation may be controlled from the *View* menu or the keyboard. The data gathered from each group is considered as the basis of one frame of the animation.

Using the Animation Submenu

The *animate* submenu (Figure 2.10) allows either continuous or single-step animation of a group of frames. Table 2.2 lists the options in the *animate* submenu.

Figure 2.10 Animate Submenu

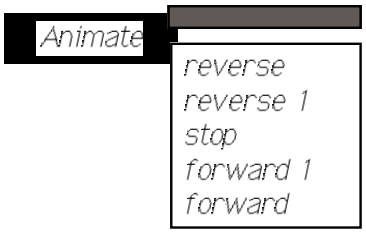


Table 2.2 Animate Submenu Options

OPTIONS	PURPOSE
reverse	animates the frames backward from the current frame.
reverse1	moves the scene back by one frame.
stop	stops any forward or backward animation.
forward1	moves the scene ahead by one frame.
forward	animates the frames forward from the current frame (in alphabetical order byname of the group).

Using the Keyboard

You may also single-step through an animation using the keyboard. Press "+" while the cursor is in the View window to move the animation ahead one frame. Press "-" to move the animation back one frame.

Fly Option

One of the most important features of NCSA PolyView is the *Fly file,* which allows examination of data as it moves through a specific series of coordinates in space. The "flight" is entirely described by ASCII files.

To begin the flight:

1. Select the *Fly* menu option from the View window.

2. Select the *Fly* option again to stop the flight.

For a sample fly-by, refer to Appendix B, "Example Fly File."

Pop Option

Choose the *pop* option from the *View* menu to bring a View window that is "buried" under other windows to the front.

Redraw Option

Choose the *redraw* option from the *View* menu to regenerate an image if it gets corrupted, or if you want to return to its originally loaded display.

Reset Option

Choose the *reset* option to undo the manipulations you've performed on your image. The image appears on the screen as it did when initially loaded.

Write HDF Option

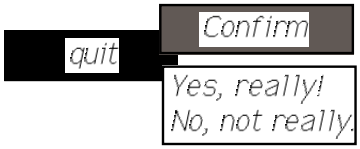
Often you will want to study or present to others an image you have created in PolyView. The option *Write HDF* writes out the current frame in the frontmost View window to an HDF 8-bit raster image file named `ris8.hdf`. The file will contain the image and its associated palette, organized in a format suitable for use with and transfer between other NCSA tools.

You may further manipulate the image by using NCSA Image, NCSA ImageIP, NCSA X Image, etc. and incorporating it into a NCSA Layout where you may annotate it. Refer to Appendix D, "Obtaining NCSA Software" on how to download the documents via FTP, archive server, or regular mail.

Confirm Submenu

When quitting PolyView, whether by pressing the Esc key in a graphcis window or bringing up the View window's *quit* submenu (Figure 2.11), the *Confirm* submenu is posted to confirm the request.

Figure 2.11 Quit Submenu



1. Choose the *Yes, really!* option on the submenu to quit.

or

2. Choose the *No, not really.* option on the submenu to continue using PolyView.