NAME

glFrustum – multiply the current matrix by a perspective matrix

C SPECIFICATION

void **glFrustum**(GLdouble *left*,
GLdouble *right*,
GLdouble *bottom*,
GLdouble *top*,
GLdouble *zNear*,
GLdouble *zFar*)

delim $$

PARAMETERS

left, *right*
Specify the coordinates for the left and right vertical clipping planes.

bottom, *top*
Specify the coordinates for the bottom and top horizontal clipping planes.

zNear, *zFar*
Specify the distances to the near and far depth clipping planes. Both distances must be positive.

DESCRIPTION

glFrustum describes a perspective matrix that produces a perspective projection. The current matrix (see **glMatrixMode**) is multiplied by this matrix and the result replaces the current matrix, as if **glMultMatrix** were called with the following matrix as its argument:

```
down 130 {left ( ˜˜ matrix {
ccol { {{2 ˜ "zNear"} over {"right" - "left"}} above 0 above 0 above 0 }
ccol { 0 above {{2 ˜ "zNear"} over {"top" - "bottom"}} ˜ above 0 above 0 }
ccol { A ˜˜˜˜ above B ˜˜˜˜ above C ˜˜˜˜ above -1 ˜˜˜˜}
ccol { 0 above 0 above D above 0} }  ˜˜˜ right )}

down 130
{A ˜=˜ {"right" + "left"} over {"right" - "left"}}

down 130
{B ˜=˜ {"top" + "bottom"} over {"top" - "bottom"}}

down 130
{C ˜=˜ -{{"zFar" + "zNear"} over {"zFar" - "zNear"}}}

down 130
{D ˜=˜ -{{2 ˜ "zFar" ˜ "zNear"} over {"zFar" - "zNear"}}}
```

Typically, the matrix mode is **GL_PROJECTION**, and (*left*, *bottom*, –*zNear*) and (*right*, *top*, –*zNear*) specify the points on the near clipping plane that are mapped to the lower left and upper right corners of the window, assuming that the eye is located at (0, 0, 0). –*zFar* specifies the location of the far clipping plane. Both *zNear* and *zFar* must be positive.

Use **glPushMatrix** and **glPopMatrix** to save and restore the current matrix stack.

NOTES

Depth buffer precision is affected by the values specified for *zNear* and *zFar*. The greater the ratio of *zFar* to *zNear* is, the less effective the depth buffer will be at distinguishing between surfaces that are near each other. If

$r ~=~ "zFar" over "zNear"$

roughly $log sub 2 (r)$ bits of depth buffer precision are lost. Because r approaches infinity as *zNear* approaches 0, *zNear* must never be set to 0.

ERRORS

GL_INVALID_VALUE is generated if *zNear* or *zFar* is not positive.

GL_INVALID_OPERATION is generated if **glFrustum** is executed between the execution of **glBegin** and the corresponding execution of **glEnd**.

ASSOCIATED GETS

glGet with argument **GL_MATRIX_MODE**
glGet with argument **GL_MODELVIEW_MATRIX**
glGet with argument **GL_PROJECTION_MATRIX**
glGet with argument **GL_TEXTURE_MATRIX**

SEE ALSO

glOrtho, **glMatrixMode**, **glMultMatrix**, **glPushMatrix**, **glViewport**