实验九 三维图形几何变换实验

时间：2022年5月11日

地点：信息学院机房2202

1、实验内容

实现三维图形旋转、缩放变换、平移变换、错切变换、对称变换等任意一个变换

2、实验目的

调用函数完成三维图形几何变换

3、实验代码

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| #include <windows.h>  #include <iostream>  #include <GL/glut.h>  #define RADDEG 57.29577951f  float XUP[3] = {1,0,0}, XUN[3] = {-1, 0, 0},  YUP[3] = {0,1,0}, YUN[3] = { 0,-1, 0},  ZUP[3] = {0,0,1}, ZUN[3] = { 0, 0,-1},  ORG[3] = {0,0,0};  GLfloat viewangle = 0, tippangle = 0;  GLfloat d[3] = {0.1, 0.1, 0.1};  GLfloat xAngle = 0.0, yAngle = 0.0, zAngle = 0.0;  void Keyboard (unsigned char key, int x, int y)  {  switch (key) {  case 'd' : d[0] += 0.1; std::cout<<"sağ"<<std::endl; break;  case 'w' : d[1] += 0.1; std::cout<<"yukarı"<<std::endl; break;  case 'e' : d[2] += 0.1; std::cout<<"yakınlaş"<<std::endl; break;  case 's' : d[1] -= 0.1; std::cout<<"aşağı"<<std::endl; break;  case 'a' : d[0] -= 0.1; std::cout<<"sol"<<std::endl;break;  case 'z' : d[2] -= 0.1; std::cout<<"uzaklaş"<<std::endl; break; break;  case 'k' : xAngle += 5; std::cout<<"X ekseninde döndür"<<std::endl; break; break;break;  case 'l' : yAngle += 5; std::cout<<"Y ekseninde döndür"<<std::endl; break; break; break;  case 'm' : zAngle += 5; std::cout<<"Z ekseninde döndür"<<std::endl; break; break;break;  }  glutPostRedisplay();  }  void Triad (void)  {  glColor3f (1.0, 1.0, 1.0);  glBegin (GL\_LINES);  glVertex3fv (ORG); glVertex3fv (XUP);  glVertex3fv (ORG); glVertex3fv (YUP);  glVertex3fv (ORG); glVertex3fv (ZUP);  glEnd ();  }  void home(void)  {  glClear(GL\_COLOR\_BUFFER\_BIT);  glColor3f(0.0,0.4,0.2);  glBegin(GL\_POLYGON);  glVertex3f (0.1, 0.1, 0.0);  glVertex3f (0.4, 0.1, 0.0);  glVertex3f (0.4, 0.5, 0.0);  glVertex3f (0.1, 0.5, 0.0);  glEnd();  glColor3f(1.0,0.0,0.0);  glBegin(GL\_POLYGON);  glVertex3f (0.10, 0.5, 0.0);  glVertex3f (0.4, 0.5, 0.0);  glVertex3f (0.25, 0.75, 0.0);  glEnd();  glColor3f(0.0,1.0,0.0);  glBegin(GL\_POLYGON);  glVertex3f (0.4, 0.1, 0.0);  glVertex3f (0.8, 0.4, 0.0);  glVertex3f (0.8, 0.75, 0.0);  glVertex3f (0.4, 0.5, 0.0);  glEnd();  glColor3f(0.4,0.0,0.4);  glBegin(GL\_POLYGON);  glVertex3f (0.4, 0.5, 0.0);  glVertex3f (0.8, 0.75, 0.0);  glVertex3f (0.62, 0.93, 0.0);  glVertex3f (0.25, 0.75, 0.0);  glEnd();  glFlush();  }  void redraw (void)  {  int v;  glClear (GL\_COLOR\_BUFFER\_BIT | GL\_DEPTH\_BUFFER\_BIT);  glEnable (GL\_DEPTH\_TEST);  glLoadIdentity ();  glTranslatef (0, 0, -3);  glRotatef (tippangle, 1,0,0);  glRotatef (viewangle, 0,1,0);  glDisable (GL\_LIGHTING);  Triad ();  glPushMatrix ();  glTranslatef (d[0], d[1], d[2]);  glScalef (0.2, 0.2, 0.2);  glRotatef (zAngle, 0,0,1);  glRotatef (yAngle, 0,1,0);  glRotatef (xAngle, 1,0,0);  home ();  glPopMatrix ();  glutSwapBuffers();  }  int main (int argc, char \*\*argv)  {  glutInit (&argc, argv);  glutInitWindowSize (900, 600);  glutInitWindowPosition (300, 300);  glutInitDisplayMode (GLUT\_DEPTH | GLUT\_DOUBLE);  glutCreateWindow ("Home");  glutDisplayFunc ( redraw );  glutKeyboardFunc ( Keyboard );  glClearColor (0.1, 0.0, 0.1, 1.0);  glMatrixMode (GL\_PROJECTION);  gluPerspective (60, 1.5, 1, 10);  glMatrixMode (GL\_MODELVIEW);  glutMainLoop ();  return 1;  } |

4、实验总结

在进行三维变换时，基本操作方法和原理与二维变换一致，主要区别在于变换矩阵从3\*3变为了4\*4。