EXPERIMENT 4-APPLICATION OF DIFFERENTIAL EQUATIONS IN THE FIELD OF ROBOTICS

AIM:

To determine the acceleration of the arm of robot for movements using matlab

MATHEMATICAL BACKGROUND:

Robotics is a rapidly upcoming field in the present.It deals with movement of robots in a desired,programmed way.To calculate such precise movements ,differential equation is involved.For example to control the motion of a robot’s arm, the differential equation

0.5\*d2y/dt2 =s

Should be solved.Here “s” is the change in coordinate of the robot’s arm .The constraint is that y(0) is 0 and Dy(0)=0.To solve this mathematically,we need to do the following:

displaymath197

Write down the **characteristic equation**

displaymath199

**(1)**

If tex2html_wrap_inline201 and tex2html_wrap_inline203 are distinct real numbers (this happens if tex2html_wrap_inline205 ), then the general solution is

displaymath207

**(2)**

If tex2html_wrap_inline209 (which happens if tex2html_wrap_inline211 ), then the general solution is

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**(3)**

If tex2html_wrap_inline201 and tex2html_wrap_inline203 are complex numbers (which happens if tex2html_wrap_inline219 ), then the general solution is

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where

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that is

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MATLAB CODE:

clc

clear all

close all

s=input(‘Enter the position’);

eqn=’0.5\*D2x-x=0’;

inits=’s(0)=x’;

soln=dsolve(eqn,inits,’t’);

disp(soln);

clc

clear all

close all

eqn=input(‘enter the equation:’);

inits=input(‘Enter the conditions’);

y=dsolve(eqn,inik);

soln=[‘y(t)=0,char(simplify(y))];

disp(soln);

OUTPUT:

ENGINEERING INTERPRETATION:

Robotics not only involves moving of robot’s arms but also various parts .It is possible to even move the camera and legs of the robot .Also we can instruct the robot to do certain tasks like pushing,pulling,running,jumping,skipping etc.