

VIT UNIVERSITY

APPLICATIONS OF DIFFERENTIAL EQUATIONS

MAT2002

experiment-7

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1. Using Matlab, solve the following system of equations

$$y_1'' = 5y_1 - 2y_2; \quad y_2'' = -2y_1 + 2y_2 \text{ and excute it}$$

CODE:

```
clc
clear all
close all
syms x1(t) x2(t)
A=input('Enter the co efficient matrix');
lambda=eig(A)
for i=1:length(lambda)
    temp=null(A-lambda(i)*eye(size(A)));
    P(:,i)=temp./min(temp);
end
disp('the modal matraix is');
disp(P);
D =inv(P)*A*P;
X = [x1;x2];
Sol1 = dsolve(diff(x1,2) + D(1)*x1 == 0);
Sol2 = dsolve(diff(x2,2) + D(4)*x2 == 0);
disp('The solution of the system diff(X,2)+DX=0 is: ');
disp(Sol1);
disp(Sol2);
disp('The Solution of the given system is: ');
Y = P*[Sol1; Sol2]
```

INPUT:

Enter the co efficient matrix[5 -2;-2 2]

continued...

OUTPUT:

lambda =

1
6

the modal matraix is

0.5000 -2.0000
1.0000 1.0000

The solution of the system $\text{diff}(X,2)+DX=0$ is:

$C3*\cos(t) + C4*\sin(t)$

$C6*\cos(6^{1/2}*t) + C7*\sin(6^{1/2}*t)$

The Solution of the given system is:

Y =

$(C3*\cos(t))/2 - 2*C7*\sin(6^{1/2}*t) - 2*C6*\cos(6^{1/2}*t) + (C4*\sin(t))/2$
 $C6*\cos(6^{1/2}*t) + C7*\sin(6^{1/2}*t) + C3*\cos(t) + C4*\sin(t)$

SCREENSHOT:

```
Command Window
Enter the co efficient matrix[5 -2;-2 2]

lambda =

    1
    6

the modal matraix is
    0.5000    -2.0000
    1.0000     1.0000

The solution of the system diff(X,2)+DX=0 is:
C3*cos(t) + C4*sin(t)

C6*cos(6^(1/2)*t) + C7*sin(6^(1/2)*t)

The Solution of the given system is:

Y =

(C3*cos(t))/2 - 2*C7*sin(6^(1/2)*t) - 2*C6*cos(6^(1/2)*t) + (C4*sin(t))/2
C6*cos(6^(1/2)*t) + C7*sin(6^(1/2)*t) + C3*cos(t) + C4*sin(t)

fx >>
```