**BÀI TẬP VỀ NHÀ**

**MÔN KỸ THUẬT ROBOT**

Tên: Nguyễn Thanh Văn

MSSV: 20146181

**Bài 1: Vẽ trái tim**

syms l1 l2 l3 t t1 t2 c1 s1 c2 s2

l1 = 15;

l2 = 10;

for t=-pi:0.1:pi

X = 16\*(sin(t)^3);

Y = 13\*cos(t) - 5\*cos(2\*t) - 2\*cos(3\*t) - cos(4\*t);

c2 = (X^2 + Y^2 - l1^2 - l2^2)/(2\*l1\*l2); %cos(t2) = (Px^2 + Py^2 - l1^2 - l2^2)/(2\*l1\*l2)

s2 = sqrt(abs(1-c2^2)); %sin(t2) = sqrt(abs(1-cos(t2)^2))

t2 = atan2(s2,c2);

c1 = X\*(l1+l2\*c2) + Y\*l2\*s2;

s1 = Y\*(l1 + l2\*c2) - X\*l2\*s2;

t1 = atan2(s1,c1);

Px = l1\*cos(t1) + l2\*cos(t1+t2);

Py = l1\*sin(t1) + l2\*sin(t1+t2);

%ve trai tim

subplot(2,1,1);

plot(t,t2\*180/pi,'\*');

pause(0.01);

xlabel('t'); ylabel('rotation')

hold on

subplot(2,1,2);

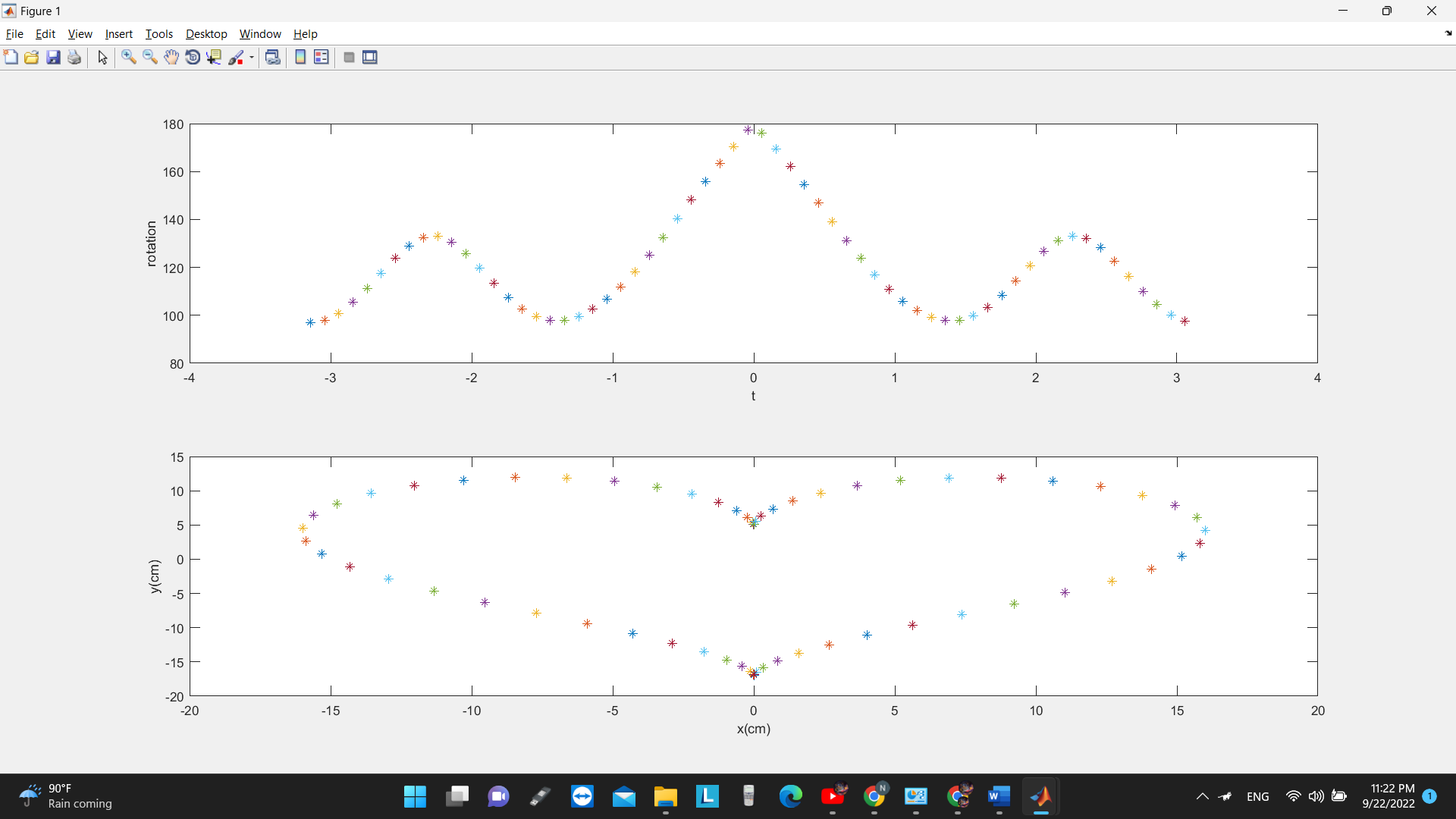
plot(Px,Py,'\*'); pause(0.01);

xlabel('x(cm)'); ylabel('y(cm)');

pause(0.01);

hold on

end



**Bài 2: Vẽ con bướm**

syms l1 l2 l3 t t1 t2 c1 s1 c2 s2 e

l1 = 5;

l2 = 5;

for t=0:0.1:2\*pi

X = sin(t)\*(exp(cos(t)) - 2\*cos(4\*t) - sin(t/12)^5);

Y = cos(t)\*(exp(cos(t)) - 2\*cos(4\*t) - sin(t/12)^5);

c2 = (X^2 + Y^2 - l1^2 - l2^2)/(2\*l1\*l2); %cos(t2) = (Px^2 + Py^2 - l1^2 - l2^2)/(2\*l1\*l2)

s2 = sqrt(abs(1-c2^2)); %sin(t2) = sqrt(abs(1-cos(t2)^2))

t2 = atan2(s2,c2);

c1 = X\*(l1+l2\*c2) + Y\*l2\*s2;

s1 = Y\*(l1 + l2\*c2) - X\*l2\*s2;

t1 = atan2(s1,c1);

Px = l1\*cos(t1) + l2\*cos(t1+t2);

Py = l1\*sin(t1) + l2\*sin(t1+t2);

%ve buom

subplot(2,1,1);

plot(t,t2\*180/pi,'\*');

pause(0.01);

xlabel('t'); ylabel('rotation')

hold on

subplot(2,1,2);

plot(Px,Py,'\*'); pause(0.01);

xlabel('x(cm)'); ylabel('y(cm)');

pause(0.01);

hold on

end

Graphical user interface, application, scatter chart

Description automatically generated

**Bài 3: Hoa 5 cánh**

syms l1 l2 l3 t t1 t2 c1 s1 c2 s2 e

l1 = 10;

l2 = 10;

for t=0:0.1:5\*pi

X = cos(5\*t)\*cos(t);

Y = cos(5\*t)\*sin(t);

c2 = (X^2 + Y^2 - l1^2 - l2^2)/(2\*l1\*l2); %cos(t2) = (Px^2 + Py^2 - l1^2 - l2^2)/(2\*l1\*l2)

s2 = sqrt(abs(1-c2^2)); %sin(t2) = sqrt(abs(1-cos(t2)^2))

t2 = atan2(s2,c2);

c1 = X\*(l1+l2\*c2) + Y\*l2\*s2;

s1 = Y\*(l1 + l2\*c2) - X\*l2\*s2;

t1 = atan2(s1,c1);

Px = l1\*cos(t1) + l2\*cos(t1+t2);

Py = l1\*sin(t1) + l2\*sin(t1+t2);

%ve hoa nam canh

subplot(2,1,1);

plot(t,t2\*180/pi,'\*');

pause(0.01);

xlabel('t'); ylabel('rotation')

hold on

subplot(2,1,2);

plot(Px,Py,'\*'); pause(0.01);

xlabel('x(cm)'); ylabel('y(cm)');

pause(0.01);

hold on

end

A screenshot of a computer

Description automatically generated

**Bài 4: Hoa sáu cánh**

syms l1 l2 l3 t t1 t2 c1 s1 c2 s2 e

l1 = 7;

l2 = 7;

for t=0:0.1:12\*pi

X = (1+cos(6\*t))\*cos(t);

Y = (1+cos(6\*t))\*sin(t);

c2 = (X^2 + Y^2 - l1^2 - l2^2)/(2\*l1\*l2); %cos(t2) = (Px^2 + Py^2 - l1^2 - l2^2)/(2\*l1\*l2)

s2 = sqrt(abs(1-c2^2)); %sin(t2) = sqrt(abs(1-cos(t2)^2))

t2 = atan2(s2,c2);

c1 = X\*(l1+l2\*c2) + Y\*l2\*s2;

s1 = Y\*(l1 + l2\*c2) - X\*l2\*s2;

t1 = atan2(s1,c1);

Px = l1\*cos(t1) + l2\*cos(t1+t2);

Py = l1\*sin(t1) + l2\*sin(t1+t2);

%ve hoa sau canh

subplot(2,1,1);

plot(t,t2\*180/pi,'\*');

pause(0.01);

xlabel('t'); ylabel('rotation')

hold on

subplot(2,1,2);

plot(Px,Py,'\*'); pause(0.01);

xlabel('x(cm)'); ylabel('y(cm)');

pause(0.01);

hold on

end

