**一、实验题目**

利用MATLAB使用有限差分法求解下列方程

u(1)=4 u(2)=10

**二、实验代码**

% 有限差分法finite difference method

clear

% y'' + P(x)y' + Q(x)y = R(x)

P = @(x)(x);

Q = @(x)(sin(x));

R = @(x)(x^2);

n = 100;

x\_0 = 1;

x\_n = 2;

y\_x\_0 = 4;

y\_x\_n = 10;

h = (x\_n-x\_0)/n;

x = x\_0+h:h:x\_n;

%Ax = B

A = zeros(n-1,n-1);

B = zeros(n-1,1);

for i = 1:(n-1)

B(i) = h .^ 2 \* R(x(i));

if(i == 1)

B(1) = B(1) - (1-h/2\*P(x(i)))\*y\_x\_0;

A(1,1:2) = [h.^2\*Q(x(i))-2 , (1+h/2\*P(x(i)))];

elseif(i == n-1)

B(i) = B(i) - (1+h/2\*P(x(i)))\*y\_x\_n;

A(i,end-1:end) = [(1-h/2\*P(x(i))) , h.^2\*Q(x(i))-2];

else

A(i,i-1:i-1+2) = [(1-h/2\*P(x(i))) , h.^2\*Q(x(i))-2 , (1+h/2\*P(x(i)))];

end

end

y = [y\_x\_0;A\B;y\_x\_n];

xx = [x\_0,x]';

plot(xx,y,'.-')

**三、实验结果**

