```
%%%%%%%%%%f(x, y)=3*cos(x*y)+x+y*y%%%%%%%%%%%%
clear all;                          %清除所有变量
close all;                          %清图
clc;                                %清屏
x=-4:0.02:4;
y=-4:0.02:4;
N=size(x,2);
for i=1:N
    for j=1:N
        z(i,j)=3*cos(x(i)*y(j))+x(i)+y(j)*y(j);
    end
end
mesh(x,y,z)
xlabel('x')
ylabel('y')

%%%%%%%%%%%%%%%%%%%%粒子群算法求函数极值%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%初始化%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
clear all;                          %清除所有变量
close all;                          %清图
clc;                                %清屏
N=100;                              %群体粒子个数
D=2;                                %粒子维数
T=200;                              %最大迭代次数
c1=1.5;                             %学习因子 1
c2=1.5;                             %学习因子 2
Wmax=0.8;                           %惯性权重最大值
Wmin=0.4;                           %惯性权重最小值
Xmax=4;                             %位置最大值
Xmin=-4;                            %位置最小值
Vmax=1;                             %速度最大值
Vmin=-1;                            %速度最小值
%%%%%%%%%%%%%%%%%%%初始化种群个体（限定位置和速度）%%%%%%%%%%%%%%%%%%
x=rand(N,D) * (Xmax-Xmin)+Xmin;
v=rand(N,D) * (Vmax-Vmin)+Vmin;
%%%%%%%%%%%%%%%%%%%%%%初始化个体最优位置和最优值%%%%%%%%%%%%%%%%%%%%%%
p=x;
pbest=ones(N,1);
for i=1:N
    pbest(i)=func2(x(i,:));
end
%%%%%%%%%%%%%%%%%%%%%%初始化全局最优位置和最优值%%%%%%%%%%%%%%%%%%%%%%
g=ones(1,D);
gbest=inf;
```

```
for i=1:N
    if(pbest(i)<gbest)
        g=p(i,:);
        gbest=pbest(i);
    end
end
gb=ones(1,T);
%%%%%%%%%%%%按照公式依次迭代直到满足精度或者迭代次数%%%%%%%%%%%%%%
for i=1:T
    for j=1:N
        %%%%%%%%%%%%%%%更新个体最优位置和最优值%%%%%%%%%%%%%%%%%%
        if (func2(x(j,:))<pbest(j))
            p(j,:)=x(j,:);
            pbest(j)=func2(x(j,:));
        end
        %%%%%%%%%%%%%%%%%更新全局最优位置和最优值%%%%%%%%%%%%%%%%%
        if(pbest(j)<gbest)
            g=p(j,:);
            gbest=pbest(j);
        end
        %%%%%%%%%%%%%%%%%%计算动态惯性权重值%%%%%%%%%%%%%%%%%%%%%%
        w=Wmax-(Wmax-Wmin)*i/T;
        %%%%%%%%%%%%%%%%%%%跟新位置和速度值%%%%%%%%%%%%%%%%%%%%%%%
        v(j,:)=w*v(j,:)+c1*rand*(p(j,:)-x(j,:))...
            +c2*rand*(g-x(j,:));
        x(j,:)=x(j,:)+v(j,:);
        %%%%%%%%%%%%%%%%%%%%%%%%边界条件处理%%%%%%%%%%%%%%%%%%%%%%%%
        for ii=1:D
            if (v(j,ii)>Vmax)  |  (v(j,ii)< Vmin)
                v(j,ii)=rand * (Vmax-Vmin)+Vmin;
            end
            if (x(j,ii)>Xmax)  |  (x(j,ii)< Xmin)
                x(j,ii)=rand * (Xmax-Xmin)+Xmin;
            end
        end
    end
    %%%%%%%%%%%%%%%%%%%%%%%%记录历代全局最优值%%%%%%%%%%%%%%%%%%%%%%%%
    gb(i)=gbest;
end
g;                                  %最优个体
gb(end);                            %最优值
figure
plot(gb)
xlabel('迭代次数');
```

```
ylabel('适应度值');
title('适应度进化曲线')
```