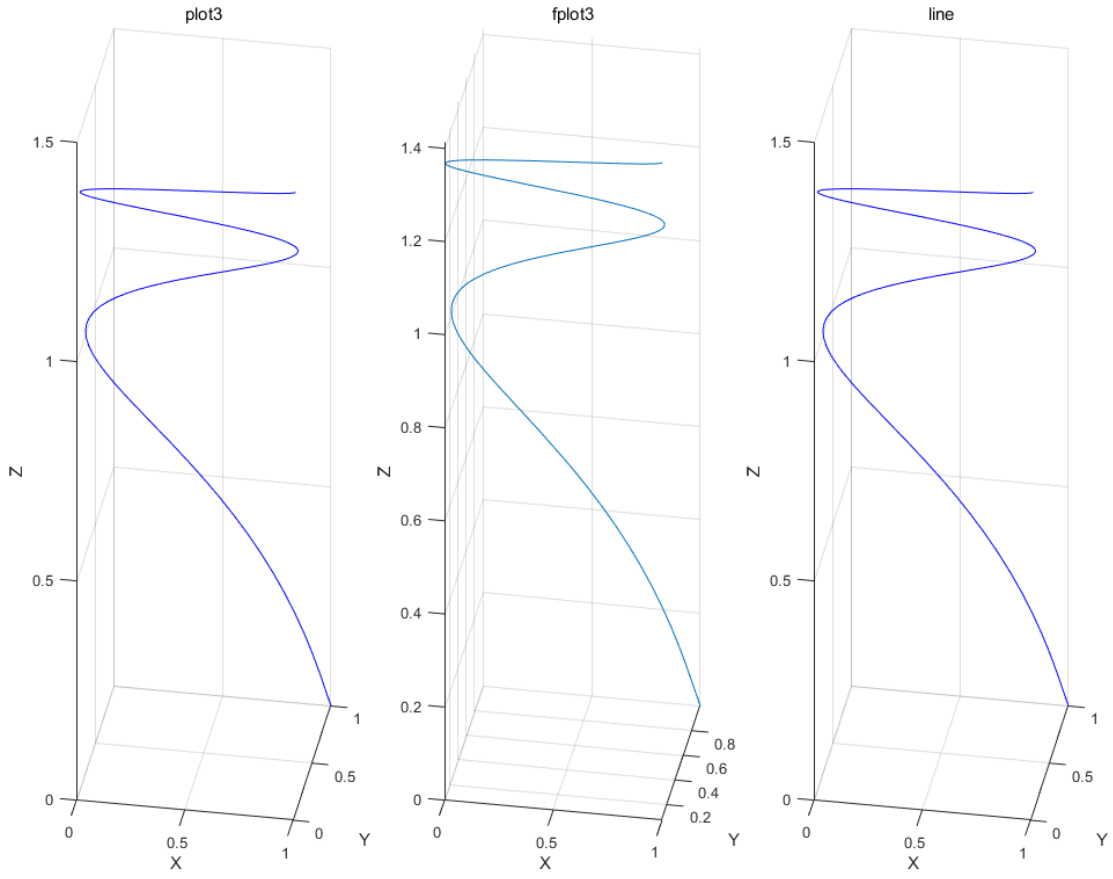
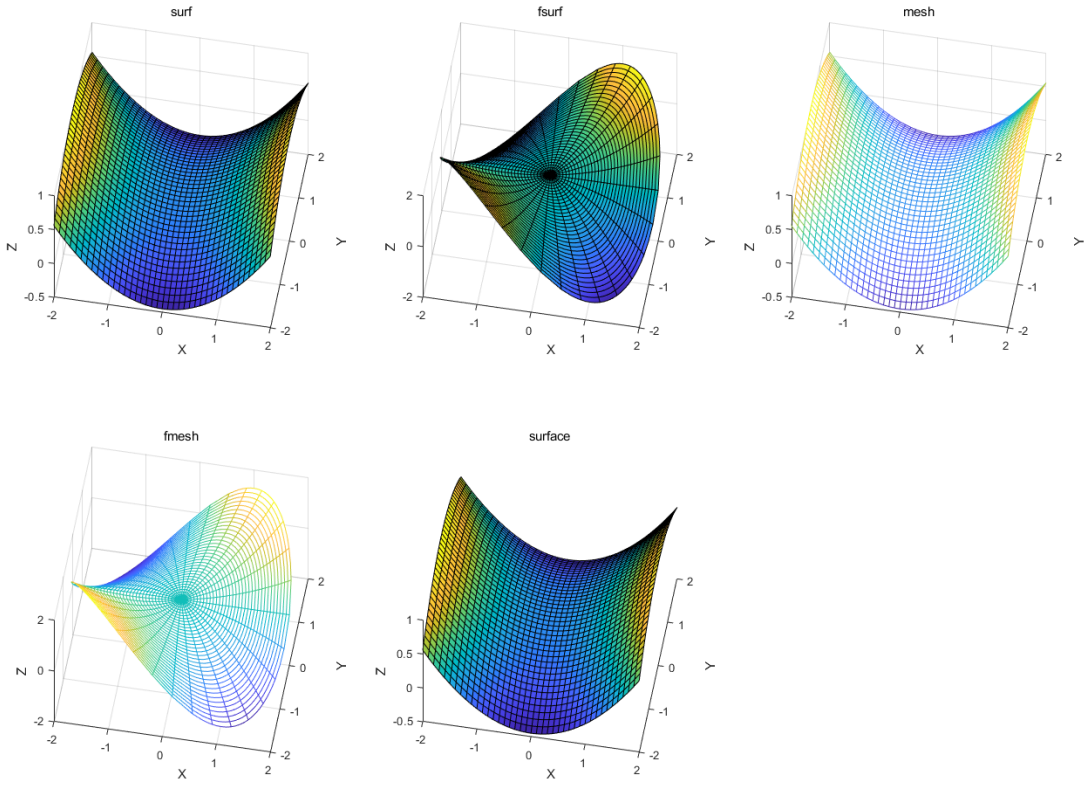
MATLAB 作业3

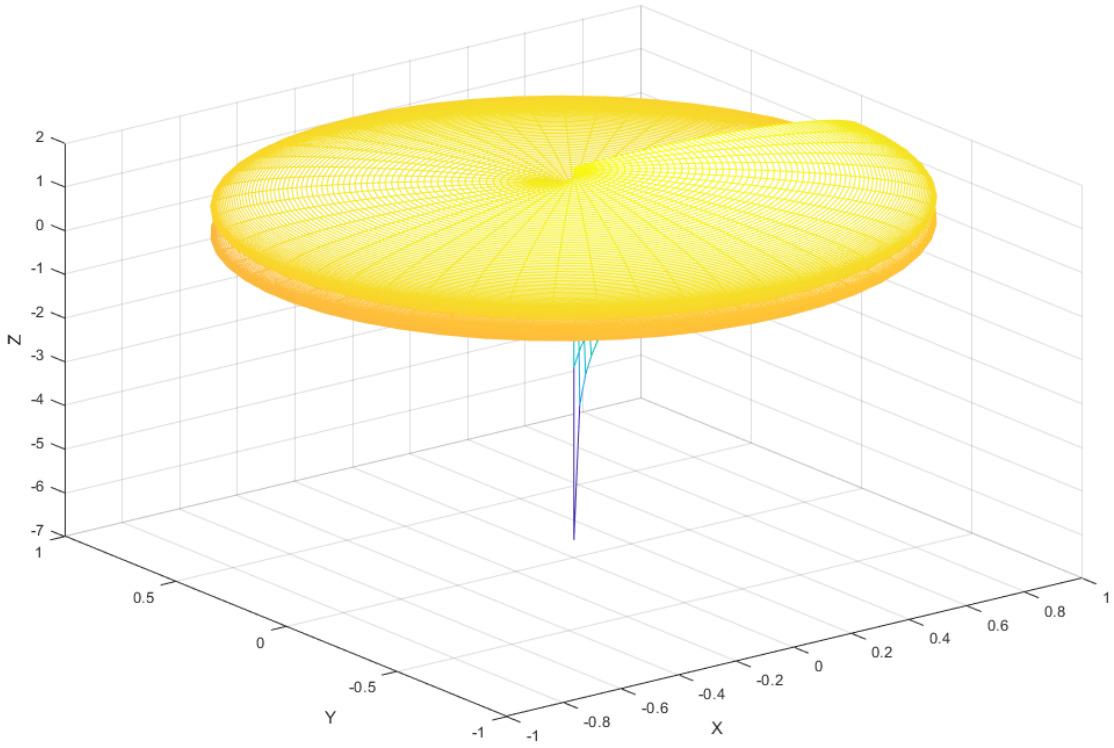
Problem1 图形



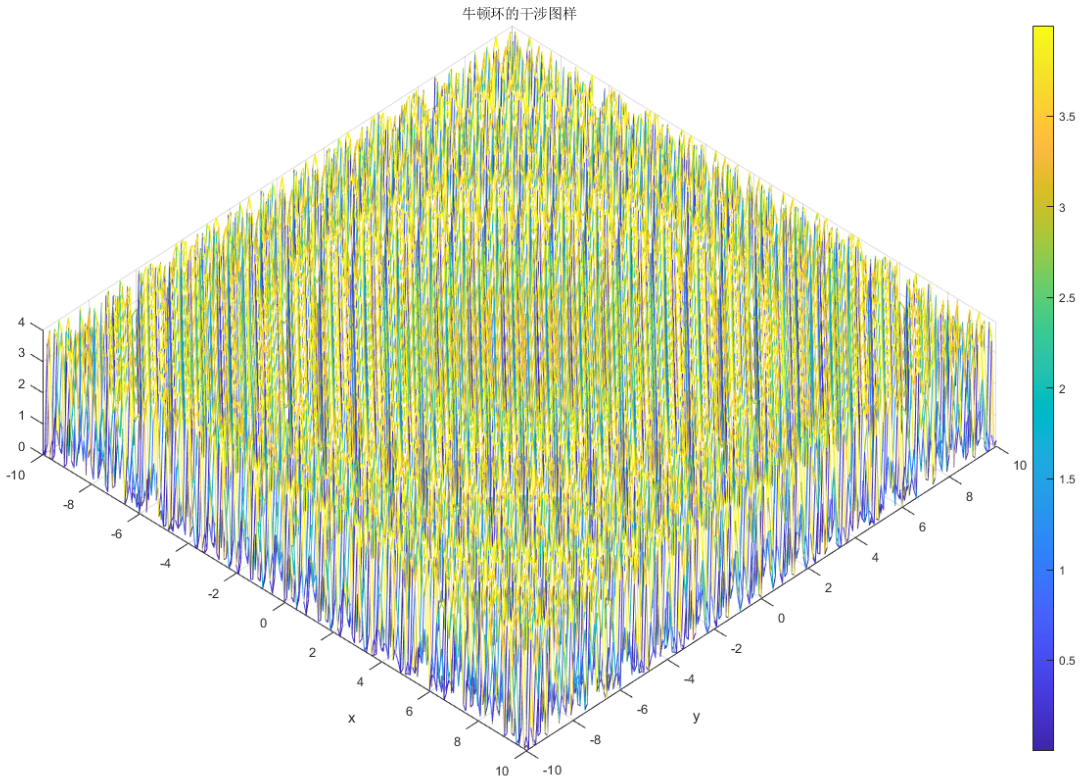
Problem2 图形



Problem3 图形



Problem4 图形



Problem 1

```
t = linspace(0, 2 * pi, 100);  % 创建一个参数 t 的范围
x = power(cos(t), 2);  % 参数方程 x(t)
y = 1./(1 + 2.*t);  % 参数方程 y(t)
z = atan(t);  % 参数方程 z(t)

subplot(1, 3, 1);
plot3(x, y, z, 'b-');
xlabel('X');
ylabel('Y');
zlabel('Z');
title('plot3');
view(10,10);
grid on;

subplot(1, 3, 2);
fplot3(@(t) power(cos(t), 2), @(t) 1./(1 + 2.*t), @(t) atan(t), [0, 2 * pi]);
xlabel('X');
ylabel('Y');
zlabel('Z');
title('fplot3');
view(10,10);
grid on;

subplot(1, 3, 3);
line(x, y, z, 'Color', 'b');
```

```
xlabel('X');
ylabel('Y');
zlabel('Z');
title('line');
view(10,10);
grid on;
```

Problem 2

```
% 定义参数 a 和 b
a = 2;
b = 3;

% 创建一个网格以生成 x 和 y 坐标
[x, y] = meshgrid(-2:0.1:2, -2:0.1:2);

% 计算双曲抛物面的 z 坐标
z = (x.^2 / a^2) - (y.^2 / b^2);

% 定义参数方程
f_x = @(r, t) 2.*r.*cos(t);
f_y = @(r, t) 2.*r.*sin(t);
f_z = @(r, t) 2.*r.*r.*sin(2.*t);

subplot(2,3,1);
surf(x, y, z);
xlabel('X');
ylabel('Y');
zlabel('Z');
title('surf');
view(10,60);

subplot(2,3,2);
fsurf(f_x, f_y, f_z, [0, 1, 0, 2*pi]);
xlabel('X');
ylabel('Y');
zlabel('Z');
title('fsurf');
view(10,60);

subplot(2,3,3);
mesh(x, y, z);
xlabel('X');
ylabel('Y');
zlabel('Z');
title('mesh');
view(10,60);

subplot(2,3,4);
fmesh(f_x, f_y, f_z, [0, 1, 0, 2*pi]);
xlabel('X');
ylabel('Y');
zlabel('Z');
title('fmesh');
view(10,60);
```

```
subplot(2,3,5);
surface(x, y, z);
xlabel('X');
ylabel('Y');
zlabel('Z');
title('surface');
view(10,60);
```

Problem 3

```
u = linspace(0, 4*pi, 100);
v = linspace(0.001, 2, 100);
[u, v] = meshgrid(u, v);

x = cos(u) .* sin(v);
y = sin(u) .* sin(v);
z = cos(v) + log(tan(v./2) + u./5);

mesh(x, y, z);
xlabel('X');
ylabel('Y');
zlabel('Z');
grid on;
```

Problem 4

```
% 创建示例数据
lambda = 5.893e-7; % 波长（光的波长）
I0 = 1;
R = 2;
[X, Y] = meshgrid(-10:0.1:10, -10:0.1:10);
% 创建一个表示 r 值的网格
r = sqrt(X.*X+Y.*Y);

% 计算牛顿环的干涉图样
I = 4.*I0.*power(cos(pi.*(r.*r/R+lambda/2)./lambda), 2);

% 绘制牛顿环的干涉图样
mesh(X, Y, I);
title('牛顿环的干涉图样');
xlabel('x');
ylabel('y');

grid on;
colormap('parula');
colorbar; % 添加颜色栏
```