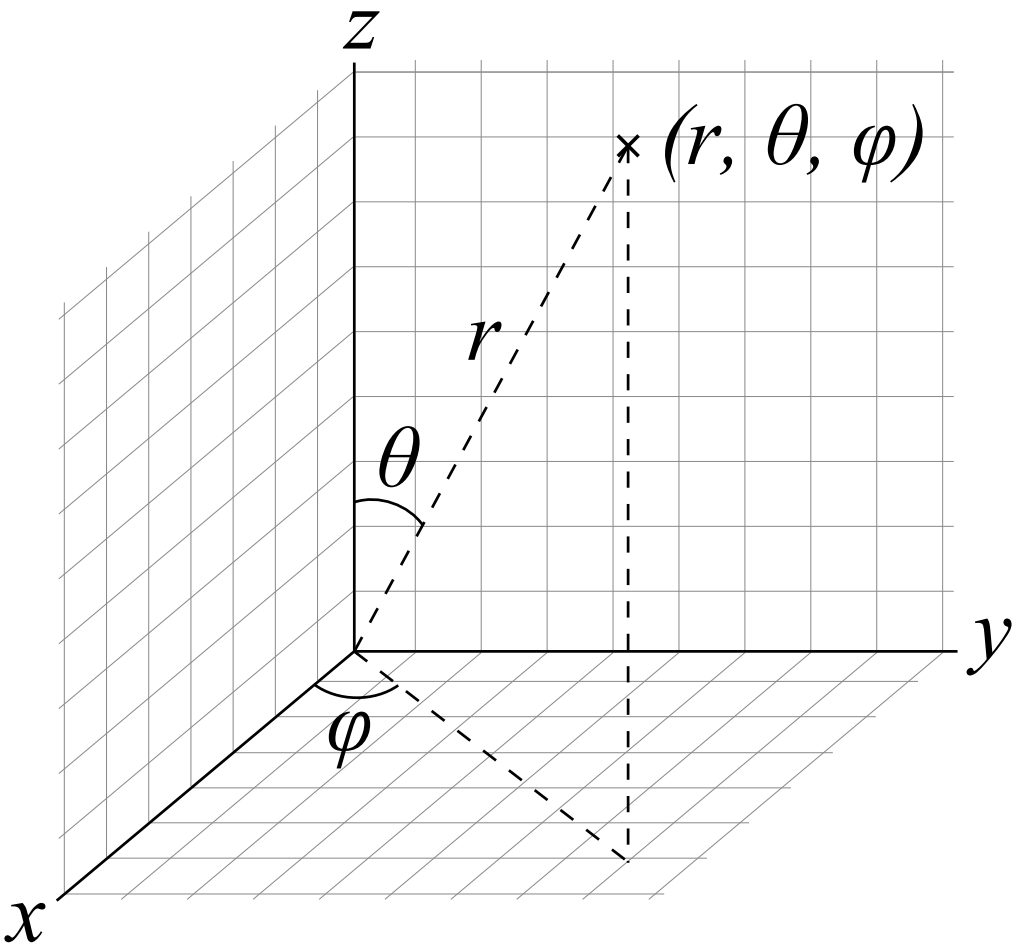
Celestial Sphere Example

This example will demonstrate how to plot and view 3d body and trace from a given 2d plane.

Contents

Setup Spherical Surface and Trace

Spherical cordinates will be used for the surface

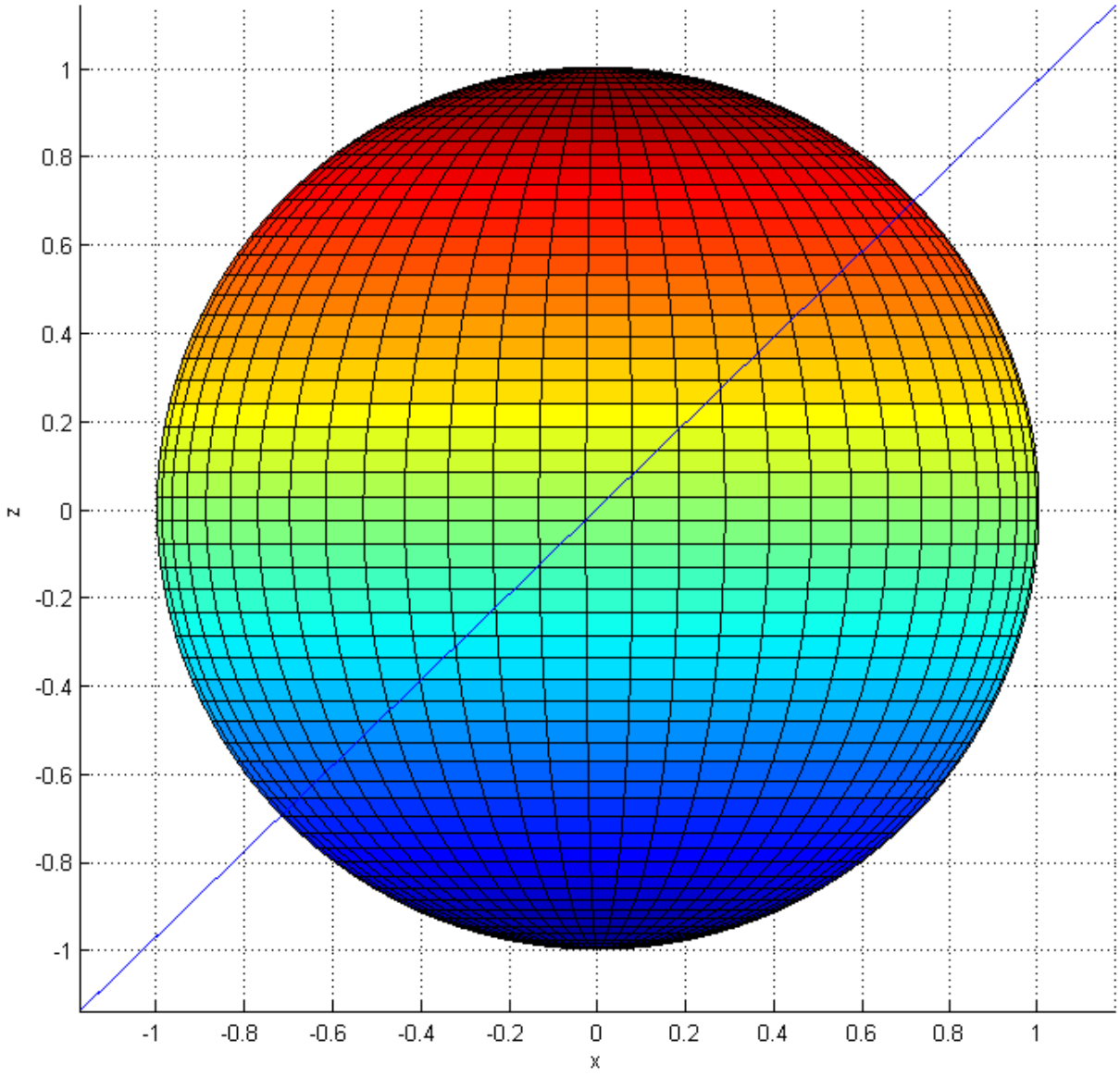


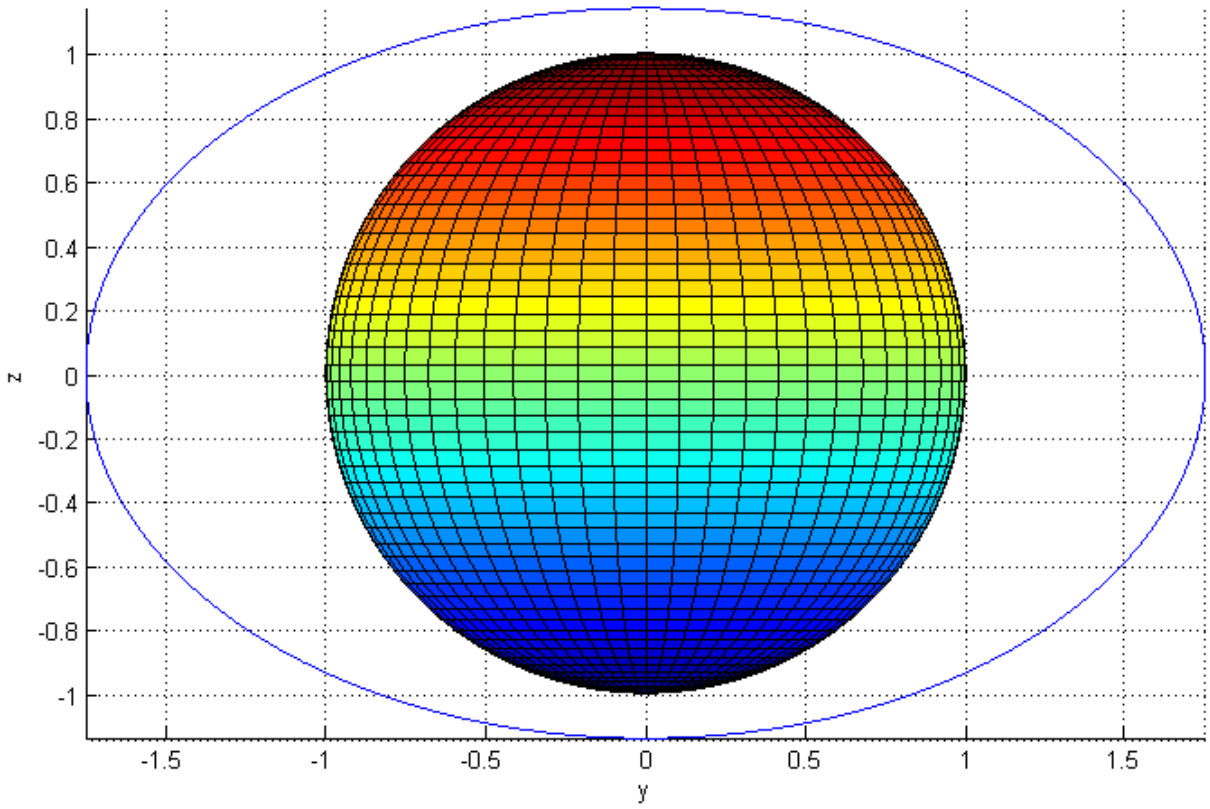

```
% Spherical Surface in Spherical Cordinates
theta1 = linspace(0,360,60);
phi1 = linspace(0,180,60);
[theta1, phi1] = meshgrid(theta1, phi1);
rho1 = 1;

% Transform  Cordinates of Spherical Surface
x1 = rho1*cosd(theta1).*sind(phi1);
y1 = rho1*sind(theta1).*sind(phi1);
z1 = rho1*cosd(phi1);

% Elliptic Trace
r_a = 1.25;
r_b = 1.75;
theta2 = linspace(0,360,120);
x2 = r_a*cosd(theta2);
y2 = r_b*sind(theta2);
```

```
z2 = zeros(size(theta2));

% rotate trace 20 degrees
% Google cordinate transformaiton for more information
beta = 20;
transformationMatrix = [cosd(beta)  0   -sin(beta);
                        0           1           0;
                        sin(beta)   0    cos(beta)];

X2 = transformationMatrix*[x2;
                           y2;
                           z2];
x2 = X2(1,:);
y2 = X2(2,:);
z2 = X2(3,:);
```

Plot and view the Surface and Trace Together

```
screen = get(0,'ScreenSize'); %This gets the dimensions your screen
figure('Position',[.2*screen(3) .2*screen(4) 800 800])
surf(x1,y1,z1)
hold('on');
plot3(x2,y2,z2)
axis('equal');
xlabel('x')
ylabel('y')
zlabel('z')
view([0 0])

figure('Position',[.2*screen(3) .2*screen(4) 800 800])
surf(x1,y1,z1)
hold('on');
plot3(x2,y2,z2)
axis('equal');
xlabel('x')
ylabel('y')
zlabel('z')
view([90 0])
```


1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
z
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
x


1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
z
-1.5
-1
-0.5
0
0.5
1
1.5
y