```
s= 3.15;
axis square
xlim ([-s, s])
ylim ([-s, s])
hold on

dr = 0.08;
dt = 1;
r_limite = 20;
t_limite = 15;

%unidades: 2GM = 1 --> (1/4GM) = 1/2

%ZONA I
for r = 1.0:dr:r_limite %para r constante
    espacio = []; %para crear una lista de valores
    tiempo = [];
    for t = -t_limite:dt:t_limite
        X = sqrt(r - 1)*exp(0.5*r)*cosh(0.5*t); %así no queda complejo
        T = sqrt(r - 1)*exp(0.5*r)*sinh(0.5*t);
        p = T + X;
        q = T - X;
        u = atan(p);
        v = atan(q);
        tau = u + v;
        R = u - v;
        espacio = [espacio R];
        tiempo = [tiempo tau];
    end
    plot(espacio, tiempo, 'r')
    hold on

end

for t = -t_limite:dt:t_limite %para t constante
    espacio = [];
    tiempo = [];
    for r = 1.000000:dr:r_limite
        X = sqrt(r - 1)*exp(0.5*r)*cosh(0.5*t);
        T = sqrt(r - 1)*exp(0.5*r)*sinh(0.5*t);
        p = T + X;
        q = T - X;
        u = atan(p);
        v = atan(q);
        tau = u + v;
        R = u - v;
        espacio = [espacio R];
        tiempo = [tiempo tau];
    end
    plot(espacio, tiempo, 'b')
    hold on

end
```

```
%ZONA II
for r = 0.0:dr:1.0
    espacio = []
    tiempo = []
    for t= -t_limite:dt:t_limite
        X = sqrt(1 - r)*exp(0.5*r)*sinh(0.5*t);
        T = sqrt(1 - r)*exp(0.5*r)*cosh(0.5*t);
        p = T + X;
        q = T - X;
        u = atan(p);
        v = atan(q);
        tau = u + v;
        R = u - v;
        espacio = [espacio R];
        tiempo = [tiempo tau];
    end
    plot(espacio, tiempo, 'r')

end
```

```
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
```

```
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
```

```
for t = -t_limite:dt:t_limite
    espacio = [];
    tiempo = [];
    for r = 1.0:-dr:0.0
        X = sqrt(1 - r)*exp(0.5*r)*sinh(0.5*t);
        T = sqrt(1 - r)*exp(0.5*r)*cosh(0.5*t);
        p = T + X;
        q = T - X;
        u = atan(p);
        v = atan(q);
        tau = u + v;
        R = u - v;
        espacio = [espacio R];
        tiempo = [tiempo tau];
    end
    plot(espacio, tiempo, 'b')
    hold on
end
```

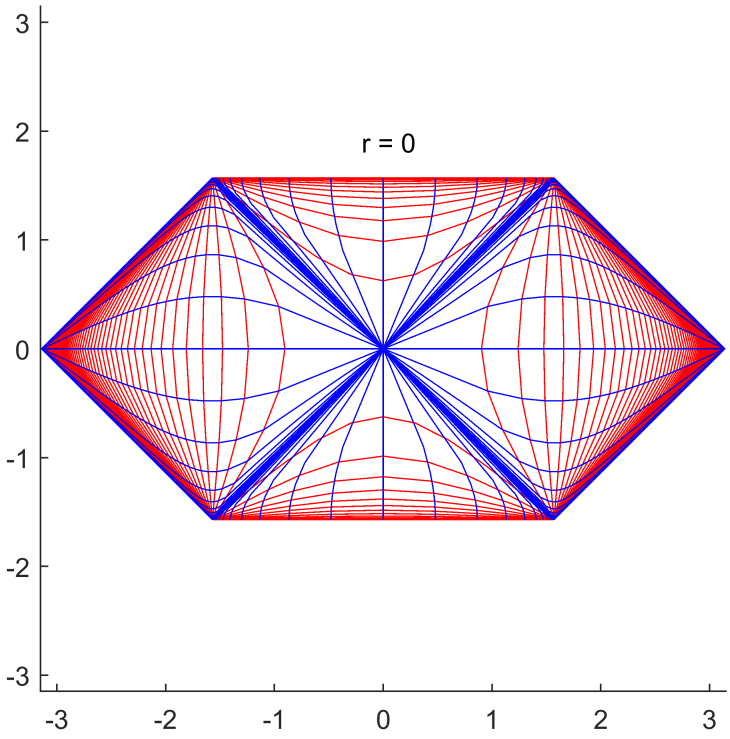
```
%ZONA III
for r = 1.0:dr:r_limite
    espacio = [];
    tiempo = [];
    for t = -t_limite:dt:t_limite
        X = -sqrt(r - 1)*exp(0.5*r)*cosh(0.5*t);
        T = -sqrt(r - 1)*exp(0.5*r)*sinh(0.5*t);
        p = T + X;
        q = T - X;
        u = atan(p);
        v = atan(q);
        tau = u + v;
        R = u - v;
        espacio = [espacio R];
        tiempo = [tiempo tau];
    end
    plot(espacio, tiempo, 'r')
    hold on

end

for t = -t_limite:dt:t_limite %para t constante
    espacio = [];
    tiempo = [];
    for r = 1.000000:dr:r_limite
        X = -sqrt(r - 1)*exp(0.5*r)*cosh(0.5*t);
        T = -sqrt(r - 1)*exp(0.5*r)*sinh(0.5*t);
        p = T + X;
        q = T - X;
        u = atan(p);
        v = atan(q);
        tau = u + v;
        R = u - v;
        espacio = [espacio R];
        tiempo = [tiempo tau];
    end
    plot(espacio, tiempo, 'b')
    hold on

end

%ZONA IV
for r = 0.0:dr:1.0
    espacio = []
    tiempo = []
    for t= -t_limite:dt:t_limite
        X = -sqrt(1 - r)*exp(0.5*r)*sinh(0.5*t);
        T = -sqrt(1 - r)*exp(0.5*r)*cosh(0.5*t);
        p = T + X;
        q = T - X;
        u = atan(p);
        v = atan(q);
        tau = u + v;
        R = u - v;
```

```
        espacio = [espacio R];
        tiempo = [tiempo tau];
    end
    plot(espacio, tiempo, 'r')

end
```

```
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
```

```
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
espacio =

     []
tiempo =

     []
```

```
for t = -t_limite:dt:t_limite
    espacio = [];
    tiempo = [];
    for r = 1.0:-dr:0.0
        X = -sqrt(1 - r)*exp(0.5*r)*sinh(0.5*t);
        T = -sqrt(1 - r)*exp(0.5*r)*cosh(0.5*t);
        p = T + X;
        q = T - X;
        u = atan(p);
        v = atan(q);
        tau = u + v;
        R = u - v;
        espacio = [espacio R];
        tiempo = [tiempo tau];
    end
    plot(espacio, tiempo, 'b')
    hold on
end

txt = {'r = 0'};
text(-0.2,1.9,txt)
```


r = 0
3
2
1
0
-1
-2
-3
-3
-2
-1
0
1
2
3