assgn2

November 24, 2019

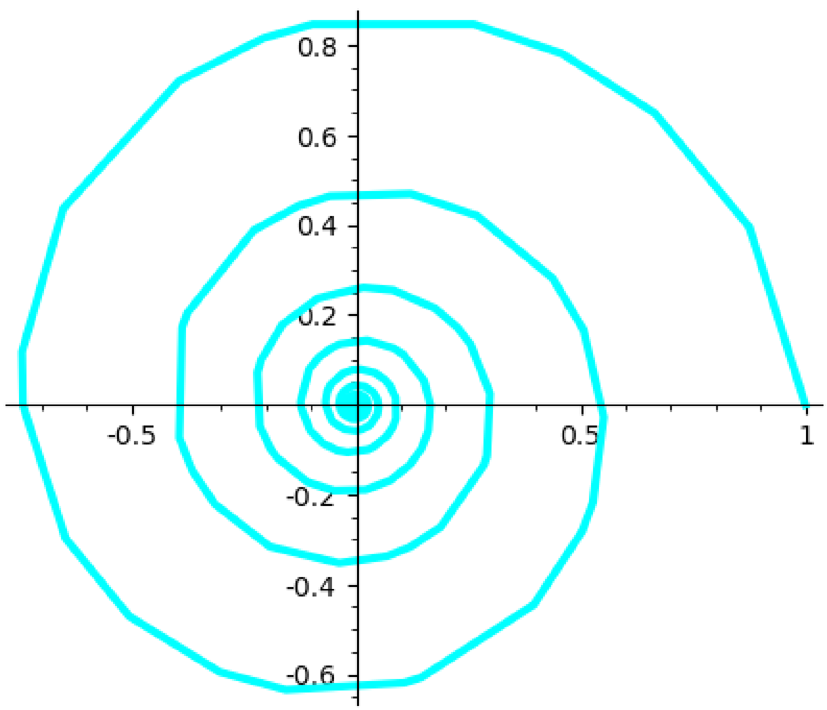
For the spiral we need to implement two things downward motion and decreasing radius

The spiral in 2-D shall be treated as a separate problem We need r to decrease constantly with theta Let Particle be moving with constant angular velocity then, = wt

[32]:
```
var('a',"theta",'w','t')
a=1.1 #close to 1 gives large no of curls
```

[20]:
```
polar_plot(a^(-theta), (theta, 0, 20*pi), color=hue(0.5), thickness=3)
```

[20]:



`r=a**{-theta} theta=wt as angular velocity constant`

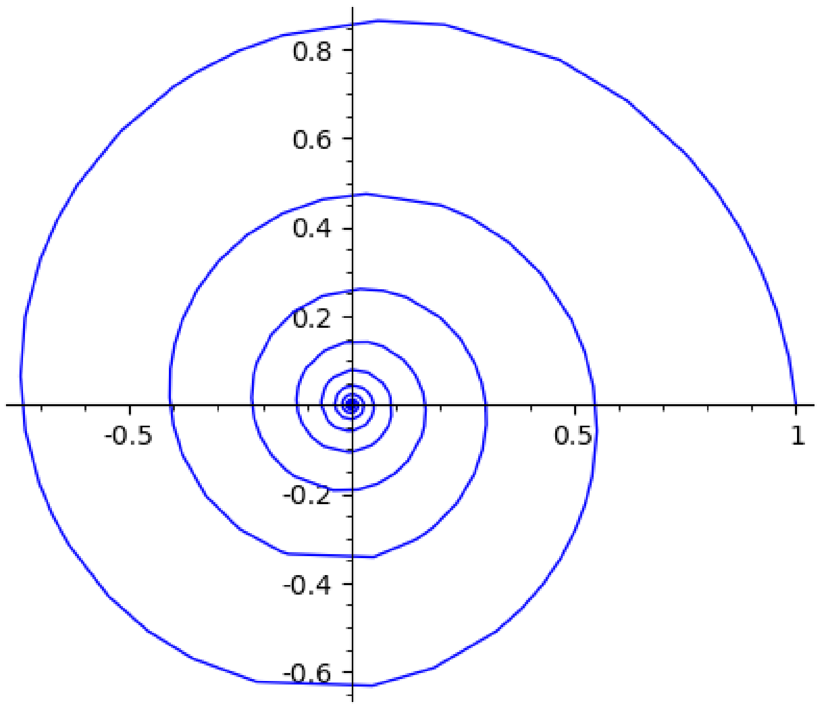
`taking cartesian components x=rcos(theta); y=rsin(theta)`

`**x=a^(-wt)*(sin(wt)); y=a^(-wt)(cos(wt))**`

[30]:
```
w=1
```

[40]:
```
parametric_plot([(a**(-t))*(cos(t)), (a**(-t))*(sin(t))], (t, 0, 20*pi), fill =
↪False, aspect_ratio=1)
```

[40]:



z varies quadratically as -1/2g(eff)t^2 but in fluid g eff will be less so we'll take g=4

[41]:
```
parametric_plot3d([(a**(-t))*(cos(t)), (a**(-t))*(sin(t)), -2*t**2], (t, 0,
↪20*pi),boundary_style={"color": "black", "thickness": 2})
```

[41]: Graphics3d Object

[44]:
```
#for a linear z
parametric_plot3d([(a**(-t))*(cos(t)), (a**(-t))*(sin(t)), -t], (t, 0,
↪20*pi),boundary_style={"color": "black", "thickness": 2})
```

[44]: Graphics3d Object