Артём Михеев

Проект 5. n-body problem

Обновлено

```
import matplotlib.pyplot as plt
import numpy as np
G = 6.67*(10**-11)
Ma = 6e24
Mb = 7e22
Mc = 2e27
day=24*60*60
gravconst12 = G*Ma*Mb
gravconst13 = G*Ma*Mc
gravconst23 = G*Mb*Mc
Ra=np.array([0.0,0.0,0.0])
Rb=np.array([4e8,1e5,0.0])
Rc=np.array([0.0,0.0,2e9])
Va=np.array([30000.0,0.0,10000.0])
Vb=np.array([200.0,4000.0,5000.0])
Vc=np.array([4000.0,3000.0,-3000.0])
t=0
dt=0.01*day
Ax = []
Ay = []
Az = []
Bx = []
By = []
Bz = []
Cx = []
Cy = []
Cz = []

while t<100*day:
    Rab=Rb-Ra
    Rac=Rc-Ra
    Rbc=Rc-Rb
    rab = np.linalg.norm(Rb-Ra)
    rac = np.linalg.norm(Rc-Ra)
    rbc = np.linalg.norm(Rc-Rb)
    Fab = (gravconst12/(rab**3))*Rab
    Fac = (gravconst12/(rac**3))*Rac
    Fbc = (gravconst23/(rbc**3))*Rbc
    Va+=(Fab/Ma)*dt
    Vb+=(-Fab/Mb)*dt
    Va+=(Fac/Ma)*dt
    Vc+=(-Fac/Mb)*dt
    Vb+=(Fbc/Ma)*dt
    Vc+=(-Fbc/Mb)*dt

    Ra+=Va
    Rb+=Vb
    Rc+=Vc
    t+=dt

    Ax.append(Ra[0])
    Ay.append(Ra[1])
    Az.append(Ra[2])
    Bx.append(Rb[0])
    By.append(Rb[1])
    Bz.append(Rb[2])
    Cx.append(Rc[0])
    Cy.append(Rc[1])
    Cz.append(Rc[2])

fig = plt.figure()
ax = fig.add_subplot(111, projection='3d')
```

```
ax.scatter(Ax, Az, Ay,c='blue')
ax.scatter(Bx, Bz, By,c="grey")
ax.scatter(Cx, Cz, Cy,c="yellow")
ax.set_xlabel('X (m)')
ax.set_ylabel('Z (m)')
ax.set_zlabel('Y (m)')

plt.show()
```