

Артём Михеев

## Проект 5. n-body problem

Обновлено

```
1 import matplotlib.pyplot as plt
2 import numpy as np
3 G = 6.67*(10**-11)
4 Ma = 6e24
5 Mb = 7e22
6 Mc = 2e27
7 day=24*60*60
8 gravconst12 = G*Ma*Mb
9 gravconst13 = G*Ma*Mc
10 gravconst23 = G*Mb*Mc
11 Ra=np.array([0.0,0.0,0.0])
12 Rb=np.array([4e8,1e5,0.0])
13 Rc=np.array([0.0,0.0,2e9])
14 Va=np.array([30000.0,0.0,10000.0])
15 Vb=np.array([200.0,4000.0,5000.0])
16 Vc=np.array([4000.0,3000.0,-3000.0])
17 t=0
18 dt=0.01*day
19 Ax = []
20 Ay = []
21 Az = []
22 Bx = []
23 By = []
24 Bz = []
25 Cx = []
26 Cy = []
27 Cz = []
28
29 while t<100*day:
30     Rab=Rb-Ra
31     Rac=Rc-Ra
32     Rbc=Rc-Rb
33     rab = np.linalg.norm(Rb-Ra)
34     rac = np.linalg.norm(Rc-Ra)
35     rbc = np.linalg.norm(Rc-Rb)
36     Fab = (gravconst12/(rab**3))*Rab
37     Fac = (gravconst12/(rac**3))*Rac
38     Fbc = (gravconst23/(rbc**3))*Rbc
39     Va+=(Fab/Ma)*dt
40     Vb+=(-Fab/Mb)*dt
41     Va+=(Fac/Ma)*dt
42     Vc+=(-Fac/Mb)*dt
43     Vb+=(Fbc/Ma)*dt
44     Vc+=(-Fbc/Mb)*dt
45
46     Ra+=Va
47     Rb+=Vb
48     Rc+=Vc
49     t+=dt
50
51     Ax.append(Ra[0])
52     Ay.append(Ra[1])
53     Az.append(Ra[2])
54     Bx.append(Rb[0])
55     By.append(Rb[1])
56     Bz.append(Rb[2])
57     Cx.append(Rc[0])
58     Cy.append(Rc[1])
59     Cz.append(Rc[2])
60
61 fig = plt.figure()
62 ax = fig.add_subplot(111, projection='3d')
```

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63 ax.scatter(Ax, Az, Ay,c='blue')
64 ax.scatter(Bx, Bz, By,c="grey")
65 ax.scatter(Cx, Cz, Cy,c="yellow")
66 ax.set_xlabel('X (m)')
67 ax.set_ylabel('Z (m)')
68 ax.set_zlabel('Y (m)')
69
70 plt.show()

```

Figure 1

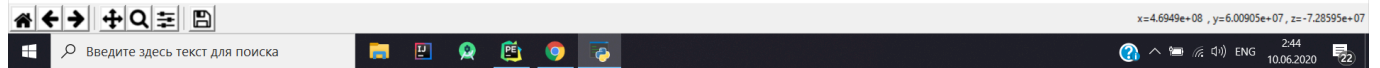
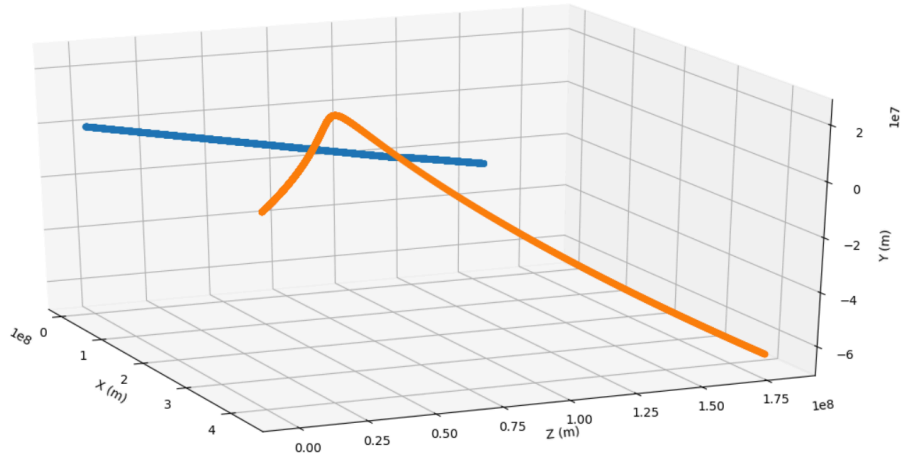


Figure 1

