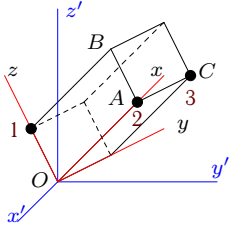


## Сферическое движение. Кинетическая энергия

Движение прямоугольного параллелепипеда массой  $m_0$  вокруг точки, закрепленной в начале координат, задано углами Эйлера. В вершинах параллелепипеда закреплены три точки с массами  $m_1$ ,  $m_2$  и  $m_3$ . Найти кинетическую энергию системы при  $t = 0$ . Массы даны в килограммах, размеры — в метрах.

### Задача D39.1.

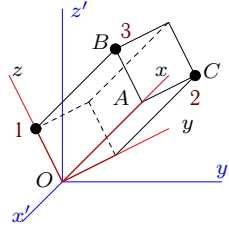
3



$$AB = AC = 3, OA = 6, \\ m_0 = 48, m_1 = 3, m_2 = 4, m_3 = 3, \\ \varphi = 2t, \psi = 4\sqrt{2}t, \theta = \pi/4.$$

### Задача D39.2.

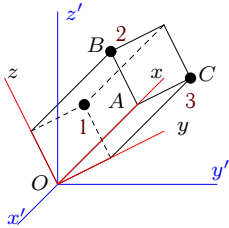
3



$$AB = 3, AC = 2, OA = 6, \\ m_0 = 48, m_1 = 3, m_2 = 6, m_3 = 3, \\ \varphi = 8t + \pi/2, \psi = \pi/4, \theta = 4t + \pi/3.$$

### Задача D39.3.

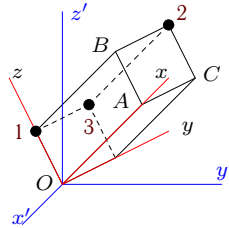
3



$$AB = 2, AC = 3, OA = 5, \\ m_0 = 48, m_1 = 3, m_2 = 5, m_3 = 1, \\ \varphi = 8t + \pi/2, \psi = \pi, \theta = -2t + \pi/3.$$

### Задача D39.4.

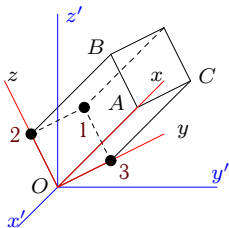
3



$$AB = 3, AC = 2, OA = 6, \\ m_0 = 48, m_1 = 3, m_2 = 7, m_3 = 2, \\ \varphi = 8t + \pi/2, \psi = \pi/3, \theta = 2t + \pi/3.$$

### Задача D39.5.

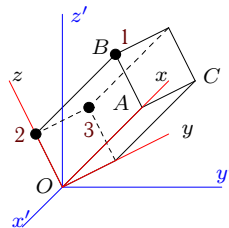
3



$$AB = AC = 2, OA = 5, \\ m_0 = 48, m_1 = 3, m_2 = 7, m_3 = 1, \\ \varphi = 4t, \psi = 2\sqrt{2}t, \theta = \pi/4.$$

### Задача D39.6.

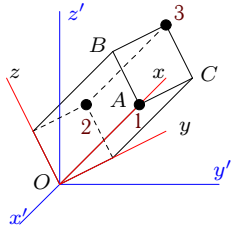
3



$$AB = 3, AC = 2, OA = 6, \\ m_0 = 36, m_1 = 3, m_2 = 6, m_3 = 2, \\ \varphi = 6t + \pi/4, \psi = 8t, \theta = -2\sqrt{2}t.$$

**Задача D39.7.**

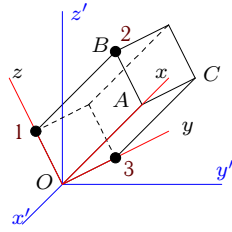
3



$AB = 3, AC = 1, OA = 4,$   
 $m_0 = 24, m_1 = 1, m_2 = 4, m_3 = 3,$   
 $\varphi = 2t, \psi = 2t + \pi/6, \theta = \pi/2.$

**Задача D39.8.**

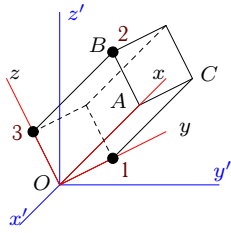
3



$AB = 2, AC = 1, OA = 5,$   
 $m_0 = 12, m_1 = 2, m_2 = 5, m_3 = 2,$   
 $\varphi = 8t + \pi/2, \psi = \pi/8, \theta = 2t + \pi/3.$

**Задача D39.9.**

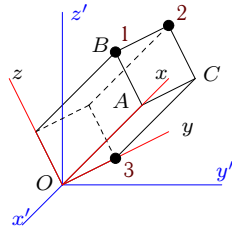
3



$AB = 3, AC = 2, OA = 6,$   
 $m_0 = 24, m_1 = 2, m_2 = 6, m_3 = 3,$   
 $\varphi = 4t, \psi = 4t + \pi, \theta = \pi/2.$

**Задача D39.10.**

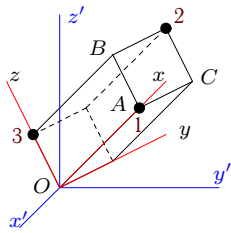
3



$AB = 2, AC = 3, OA = 4,$   
 $m_0 = 48, m_1 = 2, m_2 = 5, m_3 = 3,$   
 $\varphi = 4\sqrt{2}t + \pi/4, \psi = \pi/3, \theta = 2t + \pi/3.$

**Задача D39.11.**

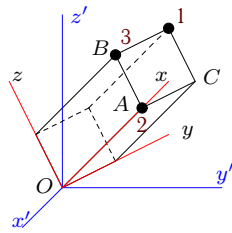
3



$AB = 3, AC = 2, OA = 4,$   
 $m_0 = 24, m_1 = 1, m_2 = 5, m_3 = 3,$   
 $\varphi = 2\sqrt{2}t + \pi/4, \psi = \pi/6, \theta = 2t + \pi/3.$

**Задача D39.12.**

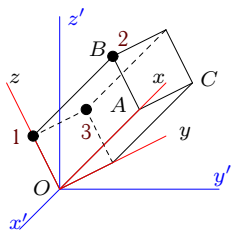
3



$AB = 3, AC = 1, OA = 6,$   
 $m_0 = 12, m_1 = 2, m_2 = 5, m_3 = 3,$   
 $\varphi = 2\sqrt{2}t + \pi/4, \psi = \pi/6, \theta = 2t + \pi/3.$

**Задача D39.13.**

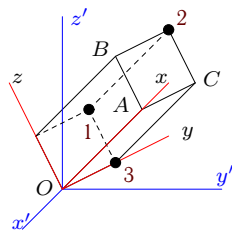
3



$AB = 3, AC = 2, OA = 4,$   
 $m_0 = 24, m_1 = 1, m_2 = 4, m_3 = 3,$   
 $\varphi = 6t, \psi = -2t + \pi/8, \theta = \pi/2.$

**Задача D39.14.**

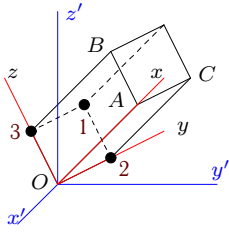
3



$AB = AC = 2, OA = 5,$   
 $m_0 = 36, m_1 = 3, m_2 = 4, m_3 = 2,$   
 $\varphi = 4t + \pi/2, \psi = \pi/2, \theta = 4t + \pi/3.$

**Задача D39.15.**

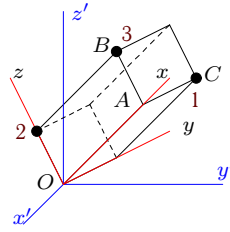
3



$AB = 1, AC = 3, OA = 5,$   
 $m_0 = 48, m_1 = 3, m_2 = 4, m_3 = 1,$   
 $\varphi = 4t + \pi/2, \psi = \pi/2, \theta = 2t + \pi/3.$

**Задача D39.16.**

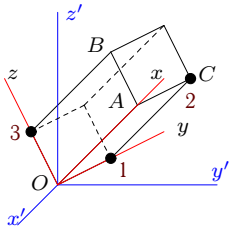
3



$AB = AC = 3, OA = 6,$   
 $m_0 = 60, m_1 = 3, m_2 = 4, m_3 = 2,$   
 $\varphi = 4t, \psi = 4\sqrt{2}t, \theta = \pi/4.$

**Задача D39.17.**

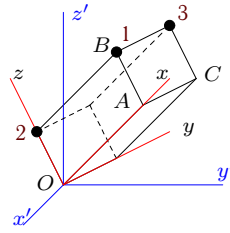
3



$AB = 2, AC = 3, OA = 6,$   
 $m_0 = 48, m_1 = 3, m_2 = 5, m_3 = 2,$   
 $\varphi = 4t + \pi/4, \psi = 8t, \theta = 4\sqrt{2}t.$

**Задача D39.18.**

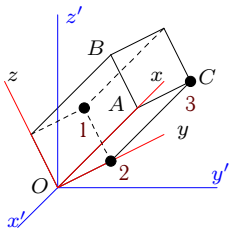
3



$AB = AC = 3, OA = 4,$   
 $m_0 = 60, m_1 = 2, m_2 = 5, m_3 = 3,$   
 $\varphi = -2t, \psi = 6\sqrt{2}t, \theta = \pi/4.$

**Задача D39.19.**

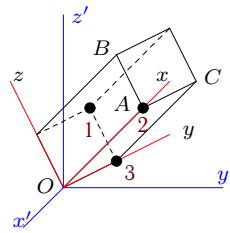
3



$AB = AC = 2, OA = 3,$   
 $m_0 = 48, m_1 = 2, m_2 = 6, m_3 = 1,$   
 $\varphi = 6t, \psi = -4t + \pi/3, \theta = \pi/2.$

**Задача D39.20.**

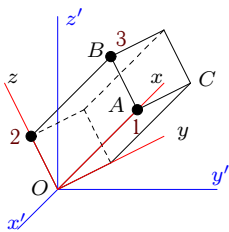
3



$AB = AC = 2, OA = 3,$   
 $m_0 = 48, m_1 = 2, m_2 = 7, m_3 = 2,$   
 $\varphi = -2t, \psi = 4\sqrt{2}t, \theta = \pi/4.$

**Задача D39.21.**

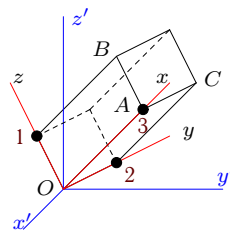
3



$AB = AC = 2, OA = 5,$   
 $m_0 = 48, m_1 = 3, m_2 = 4, m_3 = 1,$   
 $\varphi = 4t + \pi/2, \psi = \pi/8, \theta = 4t + \pi/3.$

**Задача D39.22.**

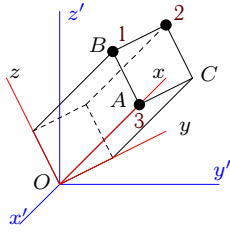
3



$AB = 3, AC = 2, OA = 4,$   
 $m_0 = 24, m_1 = 1, m_2 = 3, m_3 = 2,$   
 $\varphi = 6\sqrt{2}t + \pi/4, \psi = \pi/2, \theta = -2t + \pi/3.$

**Задача D39.23.**

3



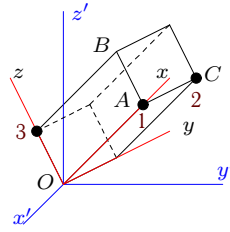
$$AB = AC = 2, OA = 6,$$

$$m_0 = 48, m_1 = 3, m_2 = 4, m_3 = 3,$$

$$\varphi = 4t, \psi = 2\sqrt{2}t, \theta = \pi/4.$$

**Задача D39.24.**

3



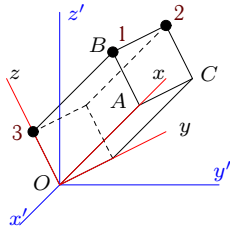
$$AB = AC = 3, OA = 4,$$

$$m_0 = 48, m_1 = 2, m_2 = 4, m_3 = 3,$$

$$\varphi = 8t + \pi/2, \psi = \pi/3, \theta = 4t + \pi/3.$$

**Задача D39.25.**

3



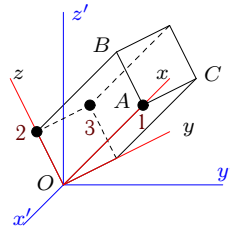
$$AB = AC = 2, OA = 5,$$

$$m_0 = 36, m_1 = 3, m_2 = 5, m_3 = 2,$$

$$\varphi = 4t + \pi/2, \psi = \pi/3, \theta = 4t + \pi/3.$$

**Задача D39.26.**

3



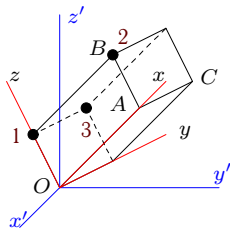
$$AB = 1, AC = 3, OA = 5,$$

$$m_0 = 48, m_1 = 3, m_2 = 4, m_3 = 1,$$

$$\varphi = 2t, \psi = 4\sqrt{2}t, \theta = \pi/4.$$

**Задача D39.27.**

3



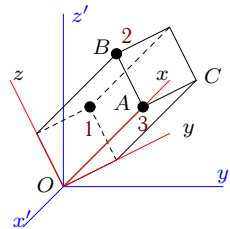
$$AB = 3, AC = 1, OA = 4,$$

$$m_0 = 24, m_1 = 1, m_2 = 7, m_3 = 3,$$

$$\varphi = 4\sqrt{2}t + \pi/4, \psi = \pi/4, \theta = -4t + \pi/3.$$

**Задача D39.28.**

3



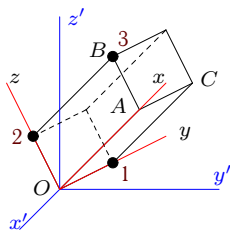
$$AB = 3, AC = 1, OA = 4,$$

$$m_0 = 24, m_1 = 1, m_2 = 5, m_3 = 2,$$

$$\varphi = 4\sqrt{2}t + \pi/4, \psi = \pi, \theta = -2t + \pi/3.$$

**Задача D39.29.**

3



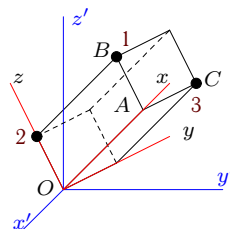
$$AB = 1, AC = 2, OA = 5,$$

$$m_0 = 24, m_1 = 2, m_2 = 3, m_3 = 2,$$

$$\varphi = 4\sqrt{2}t + \pi/4, \psi = \pi/6, \theta = -4t + \pi/3.$$

**Задача D39.30.**

3



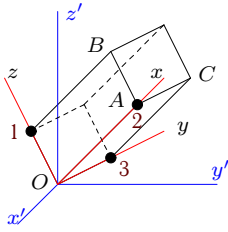
$$AB = AC = 3, OA = 4,$$

$$m_0 = 48, m_1 = 2, m_2 = 6, m_3 = 2,$$

$$\varphi = 4t + \pi/4, \psi = 4t, \theta = -2\sqrt{2}t.$$

**Задача D39.31.**

3



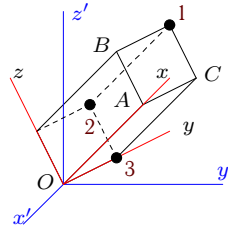
$$AB = AC = 3, OA = 6,$$

$$m_0 = 48, m_1 = 3, m_2 = 4, m_3 = 3,$$

$$\varphi = -2t, \psi = 4\sqrt{2}t, \theta = \pi/4.$$

**Задача D39.32.**

3



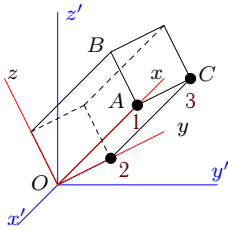
$$AB = 3, AC = 2, OA = 6,$$

$$m_0 = 36, m_1 = 2, m_2 = 5, m_3 = 2,$$

$$\varphi = 6t + \pi/4, \psi = 2t, \theta = -4\sqrt{2}t.$$

**Задача D39.33.**

3



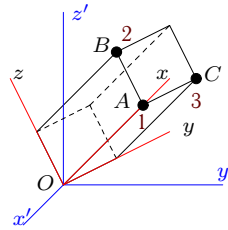
$$AB = 3, AC = 2, OA = 4,$$

$$m_0 = 24, m_1 = 1, m_2 = 6, m_3 = 2,$$

$$\varphi = 4t + \pi/4, \psi = -2t, \theta = 4\sqrt{2}t.$$

**Задача D39.34.**

3



$$AB = 2, AC = 3, OA = 4,$$

$$m_0 = 60, m_1 = 2, m_2 = 4, m_3 = 2,$$

$$\varphi = 4t + \pi/4, \psi = 4t, \theta = -2\sqrt{2}t.$$

**Д39 Ответы.****Сферическое движение. Кинетическая энергия**

03.10.2012

№	$\omega_x$	$\omega_y$	$\omega_z$	$J_x$	$J_y$	$J_z$	$J_{xy}$	$J_{xz}$	$J_{yz}$	$J_{x0}$	$J_{y0}$	$J_{z0}$	$J_{xy0}$	$J_{xz0}$	$J_{yz0}$	$T$
1	0.00	4.00	6.00	342	999	999	270	216	108	288	720	720	216	216	108	23382.0
2	0.00	-4.00	8.00	286	1098	988	216	270	72	208	720	640	144	216	72	42704.0
3	-0.00	2.00	8.00	276	646	730	195	170	90	208	464	544	180	120	72	23212.0
4	0.00	-2.00	8.00	352	1080	928	228	342	126	208	720	640	144	216	72	33872.0
5	0.00	2.00	6.00	184	504	480	120	120	60	128	464	464	120	120	48	8928.0
6	-2.00	2.00	14.00	263	747	596	108	216	66	156	540	480	108	162	54	65060.0
7	0.00	2.00	2.00	150	327	207	36	108	39	80	200	136	24	72	18	912.0
8	0.00	-2.00	8.00	50	269	231	15	80	6	20	116	104	15	30	6	8026.0
9	0.00	4.00	4.00	193	657	544	72	216	36	104	360	320	72	108	36	9032.0
10	1.41	-1.41	5.66	308	460	584	204	152	102	208	320	400	144	96	72	10120.0
11	1.41	-1.41	2.83	196	368	276	88	132	66	104	200	160	48	72	36	1580.0
12	1.41	-1.41	2.83	87	585	510	30	144	15	40	180	148	18	54	9	2256.0
13	0.00	-2.00	6.00	188	336	236	48	120	54	104	200	160	48	72	36	5568.0
14	0.00	-4.00	4.00	160	476	484	130	130	64	96	348	348	90	90	36	8704.0
15	0.00	-2.00	4.00	227	420	607	180	60	45	160	416	544	180	60	36	6056.0
16	0.00	4.00	8.00	441	1134	1107	324	306	135	360	900	900	270	270	135	40176.0
17	4.00	-4.00	12.00	288	828	972	306	144	72	208	640	720	216	144	72	80352.0
18	0.00	6.00	4.00	477	670	607	216	240	162	360	500	500	180	180	135	13028.0
19	0.00	-4.00	6.00	172	225	253	78	72	56	128	208	208	72	72	48	7698.0
20	0.00	4.00	2.00	152	279	287	72	72	56	128	208	208	72	72	48	2358.0
21	0.00	-4.00	4.00	148	584	564	120	130	48	128	464	464	120	120	48	9952.0
22	-1.41	1.41	8.49	125	241	204	48	72	36	104	200	160	48	72	36	8238.0
23	0.00	2.00	6.00	172	1028	1016	192	228	64	128	640	640	144	144	48	19576.0
24	0.00	-4.00	8.00	351	523	532	192	144	108	288	400	400	144	144	108	24664.0
25	0.00	-4.00	4.00	156	588	568	140	170	56	96	348	348	90	90	36	10144.0
26	0.00	4.00	6.00	174	496	628	180	60	39	160	416	544	180	60	36	14336.0
27	-2.83	2.83	5.66	182	411	251	24	156	27	80	200	136	24	72	18	8644.0
28	-1.41	1.41	5.66	135	366	249	24	132	21	80	200	136	24	72	18	5421.0
29	-2.83	2.83	5.66	53	263	290	60	40	12	40	208	232	60	30	12	6832.0
30	-2.00	2.00	8.00	378	536	482	168	168	108	288	400	400	144	144	108	18884.0
31	0.00	4.00	2.00	342	891	891	216	216	108	288	720	720	216	216	108	8046.0
32	-4.00	4.00	8.00	255	675	588	132	198	96	156	540	480	108	162	54	31632.0
33	4.00	-4.00	2.00	136	248	240	64	72	36	104	200	160	48	72	36	4288.0
34	-2.00	2.00	8.00	294	544	646	204	152	90	260	400	500	180	120	90	24156.0

Д39 файл о39d3A