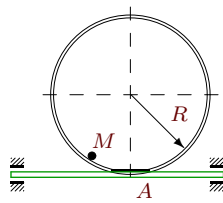
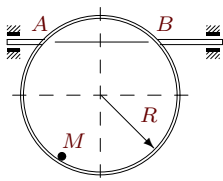
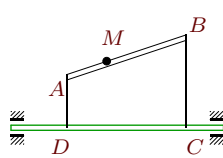
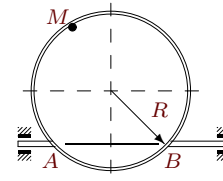
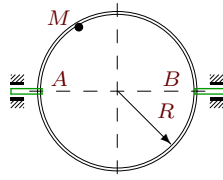
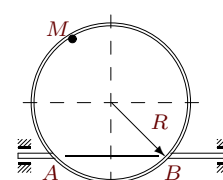
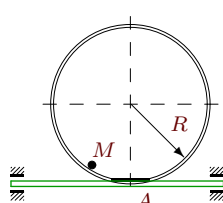
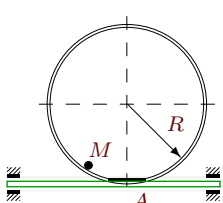


Сложное движение точки, пространственная траектория

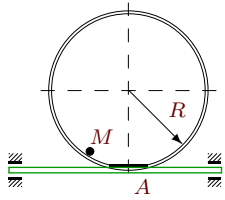
Геометрическая фигура вращается вокруг оси, лежащей в ее плоскости. По каналу, расположенному на фигуре, движется точка M по известному закону $AM(t)$ или $BM(t)$ (в см). Найти абсолютную скорость и абсолютное ускорение точки при $t = t_1$. Даны закон вращения фигуры $\varphi_e(t)$ (или постоянная угловая скорость ω_e), время t_1 и размеры фигуры. Углы даны в рад, размеры — в см. Длина BM или AM — длина отрезка прямой или дуги окружности, AB — длина отрезка прямой.

Кирсанов М.Н. **Решebник. Теоретическая механика**/Под ред. А. И. Кириллова.— М.:ФИЗМАТЛИТ, 2002.— 384 с. (с.202.)

<p>Задача 11.1 2</p>  <p style="margin-left: 20px;"> $\omega_e = 4.47 \text{ рад/с,}$ $AM = \frac{\pi}{4}(t^2 + 2)t,$ $R = 3,$ $t = 1 \text{ с.}$ </p>	<p>Задача 11.2 2</p>  <p style="margin-left: 20px;"> $\omega_e = 0.96 \text{ рад/с,}$ $AM = \frac{\pi}{3}(t^2 + 4)t,$ $R = 39,$ $AB = 39,$ $t = 3 \text{ с.}$ </p>
<p>Задача 11.3 2</p>  <p style="margin-left: 20px;"> $\varphi_e = 0.11t^2,$ $AM = \frac{1}{6}(t^3 + 2),$ $AD = 2,$ $BC = 5,$ $DC = 3,$ $t = 1 \text{ с.}$ </p>	<p>Задача 11.4 2</p>  <p style="margin-left: 20px;"> $\omega_e = 1.5 \text{ рад/с,}$ $AM = \frac{5\pi}{3}(t^2 + 4t),$ $R = 12,$ $AB = 12,$ $t = 2 \text{ с.}$ </p>
<p>Задача 11.5 2</p>  <p style="margin-left: 20px;"> $\omega_e = 0.27 \text{ рад/с,}$ $AM = \frac{\pi}{3}(t^2 + 6t),$ $R = 27,$ $t = 3 \text{ с.}$ </p>	<p>Задача 11.6 2</p>  <p style="margin-left: 20px;"> $\omega_e = 0.29 \text{ рад/с,}$ $AM = \frac{\pi}{4}(t^2 + 6t),$ $R = 27,$ $AB = 27,$ $t = 3 \text{ с.}$ </p>
<p>Задача 11.7 2</p>  <p style="margin-left: 20px;"> $\omega_e = 0.92 \text{ рад/с,}$ $AM = \frac{3\pi}{4}(t^2 + 2t),$ $R = 3,$ $t = 1 \text{ с.}$ </p>	<p>Задача 11.8 2</p>  <p style="margin-left: 20px;"> $\omega_e = 0.31 \text{ рад/с,}$ $AM = \frac{3\pi}{4}(t^2 + 6t),$ $R = 27,$ $t = 3 \text{ с.}$ </p>

Задача 11.9

2



$$\omega_e = 0.92 \text{ рад/с,}$$

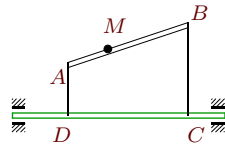
$$AM = \frac{3\pi}{4}(t^2 + 4t),$$

$$R = 12,$$

$$t = 2 \text{ с.}$$

Задача 11.10

2



$$\varphi_e = 0.17t^2,$$

$$AM = \frac{5}{6}(t^3 + 2),$$

$$AD = 2,$$

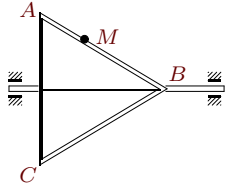
$$BC = 5,$$

$$DC = 3,$$

$$t = 1 \text{ с.}$$

Задача 11.11

2



$$\varphi_e = 0.01t^2,$$

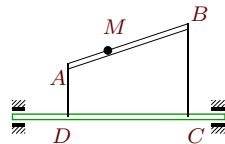
$$AM = \frac{5}{6}(t^2 + 50),$$

$$AB=BC=AC=102,$$

$$t = 1 \text{ с.}$$

Задача 11.12

2



$$\varphi_e = 0.16t^2,$$

$$AM = \frac{1}{2}(t^3 + 4),$$

$$AD = 9,$$

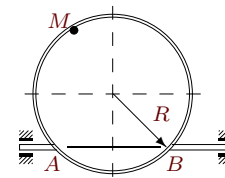
$$BC = 19,$$

$$DC = 27,$$

$$t = 3 \text{ с.}$$

Задача 11.13

2



$$\omega_e = 0.7 \text{ рад/с,}$$

$$AM = \frac{3\pi}{4}(t^3 + 3),$$

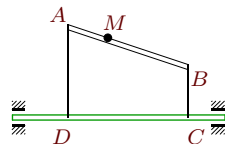
$$R = 11,$$

$$AB = 11,$$

$$t = 2 \text{ с.}$$

Задача 11.14

2



$$\varphi_e = 0t^2,$$

$$AM = \frac{1}{6}(t^2 + 51),$$

$$AD = 31,$$

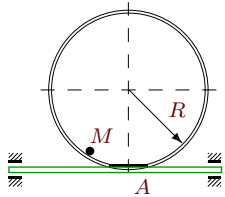
$$BC = 15,$$

$$DC = 48,$$

$$t = 2 \text{ с.}$$

Задача 11.15

2



$$\omega_e = 5.61 \text{ рад/с,}$$

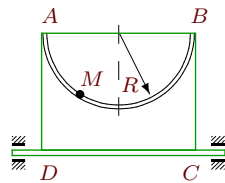
$$AM = \frac{5\pi}{3}(t^2 + 3)t,$$

$$R = 14,$$

$$t = 2 \text{ с.}$$

Задача 11.16

2



$$\omega_e = 6.7 \text{ рад/с,}$$

$$AM = \frac{3\pi}{4}(t^3 + 3),$$

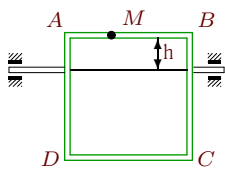
$$R = 11,$$

$$AD = 12,$$

$$t = 2 \text{ с.}$$

Задача 11.17

2



$$\varphi_e = 0.12t^2,$$

$$AM = \frac{1}{6}(t^3 + 3),$$

$$AB = 6,$$

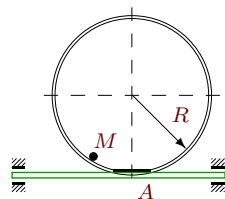
$$BC = 6,$$

$$h = 2,$$

$$t = 2 \text{ с.}$$

Задача 11.18

2



$$\omega_e = 1.34 \text{ рад/с,}$$

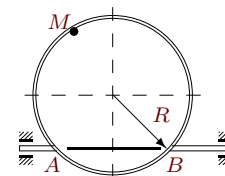
$$AM = \frac{\pi}{4}(t^3 + 2),$$

$$R = 3,$$

$$t = 1 \text{ с.}$$

Задача 11.19

2



$$\omega_e = 4.84 \text{ рад/с,}$$

$$AM = \frac{4\pi}{3}(t^3 + 2),$$

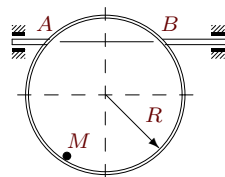
$$R = 3,$$

$$AB = 3,$$

$$t = 1 \text{ с.}$$

Задача 11.20

2



$$\omega_e = 4.21 \text{ рад/с,}$$

$$AM = \frac{4\pi}{3}(t^3 + 4),$$

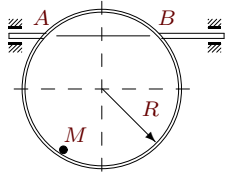
$$R = 31,$$

$$AB = 31,$$

$$t = 3 \text{ с.}$$

Задача 11.21

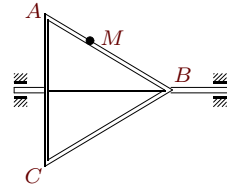
2



$\omega_e = 10 \text{ рад/с,}$
 $AM = \frac{5\pi}{3}(t^2 + 2t),$
 $R = 3,$
 $AB = 3,$
 $t = 1 \text{ с.}$

Задача 11.22

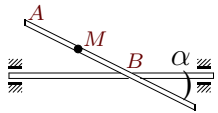
2



$\varphi_e = 0t^2,$
 $AM = \frac{1}{4}(t^2 + 50),$
 $AB=BC=AC=102,$
 $t = 1 \text{ с.}$

Задача 11.23

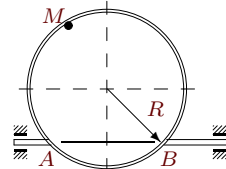
2



$\varphi_e = 0.28t^2,$
 $AM = \frac{5}{6}(t^3 + 3),$
 $AB = 22,$
 $\alpha = \pi/4,$
 $t = 2 \text{ с.}$

Задача 11.24

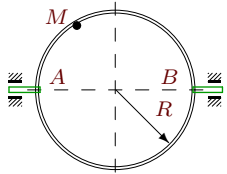
2



$\omega_e = 0.56 \text{ рад/с,}$
 $AM = \frac{3\pi}{4}(t^3 + 4),$
 $R = 31,$
 $AB = 31,$
 $t = 3 \text{ с.}$

Задача 11.25

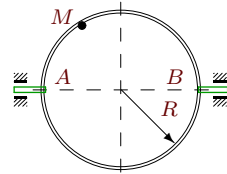
2



$\omega_e = 0.52 \text{ рад/с,}$
 $AM = \frac{\pi}{6}(t^3 + 2),$
 $R = 3,$
 $t = 1 \text{ с.}$

Задача 11.26

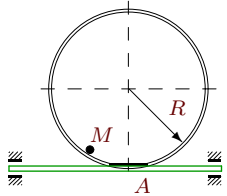
2



$\omega_e = 3.33 \text{ рад/с,}$
 $AM = \frac{3\pi}{4}(t^3 + 2),$
 $R = 3,$
 $t = 1 \text{ с.}$

Задача 11.27

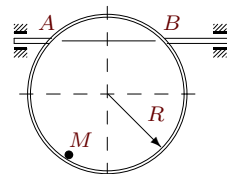
2



$\omega_e = 0.93 \text{ рад/с,}$
 $AM = \frac{4\pi}{3}(t^2 + 4t),$
 $R = 12,$
 $t = 2 \text{ с.}$

Задача 11.28

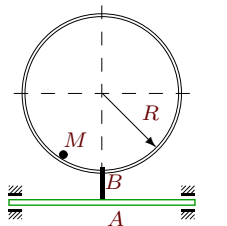
2



$\omega_e = 11.21 \text{ рад/с,}$
 $AM = \frac{3\pi}{2}(t^3 + 4),$
 $R = 31,$
 $AB = 31,$
 $t = 3 \text{ с.}$

Задача 11.29

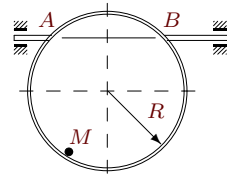
2



$\omega_e = 0.04 \text{ рад/с,}$
 $BM = \frac{\pi}{4}(t^2 + 50),$
 $R = 51,$
 $AB = 26,$
 $t = 1 \text{ с.}$

Задача 11.30

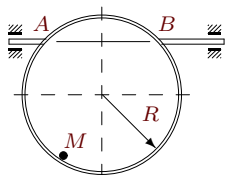
2



$\omega_e = 0.12 \text{ рад/с,}$
 $AM = \frac{\pi}{3}(t^2 + 52),$
 $R = 61,$
 $AB = 61,$
 $t = 3 \text{ с.}$

Задача 11.31

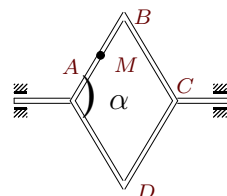
2



$\omega_e = 0.69 \text{ рад/с,}$
 $AM = \frac{3\pi}{4}(t^2 + 3)t,$
 $R = 14,$
 $AB = 14,$
 $t = 2 \text{ с.}$

Задача 11.32

2



$\varphi_e = 0.03t^2,$
 $BM = \frac{5}{6}(t^2 + 51),$
 Ромб ABCD.
 $AB = 82,$
 $\alpha = 2\pi/3,$
 $t = 2 \text{ с.}$

Сложное движение точки, пространственная траектория

№	R_e	v_r	v_e	v	ω_e	ε_e
1	0.879	3.927	3.928	5.554	4.470	0.000
2	33.775	32.463	-32.424	45.882	0.960	0.000
3	2.354	0.500	0.518	0.720	0.220	0.220
4	0.000	41.888	-0.000	41.888	1.500	0.000
5	23.383	12.566	-6.313	14.063	0.270	0.000
6	16.395	9.425	-4.754	10.556	0.290	0.000
7	5.121	9.425	-4.712	10.537	0.920	0.000
8	46.092	28.274	-14.288	31.680	0.310	0.000
9	20.485	18.850	18.846	26.655	0.920	0.000
10	3.768	2.500	-1.281	2.809	0.340	0.340
11	29.750	1.667	-0.595	1.770	0.020	0.020
12	14.383	13.500	13.808	19.311	0.960	0.320
13	20.151	28.274	-14.106	31.598	0.700	0.000
14	28.101	0.667	0.000	0.667	0.000	0.000
15	7.000	78.540	-39.270	87.810	5.610	0.000
16	4.222	28.274	28.286	39.994	6.700	0.000
17	2.000	2.000	-0.960	2.218	0.480	0.240
18	0.879	2.356	-1.177	2.634	1.340	0.000
19	2.598	12.566	12.575	17.777	4.840	0.000
20	26.847	113.097	-113.025	159.893	4.210	0.000
21	0.000	20.944	-0.000	20.944	10.000	0.000
22	44.625	0.500	0.000	0.500	0.000	0.000
23	9.075	10.000	10.163	14.258	1.120	0.560
24	56.790	63.617	-31.803	71.124	0.560	0.000
25	1.500	1.571	-0.780	1.754	0.520	0.000
26	2.121	7.069	7.064	9.993	3.330	0.000
27	18.000	33.510	-16.740	37.459	0.930	0.000
28	11.347	127.235	-127.197	179.911	11.210	0.000
29	40.938	1.571	1.638	2.269	0.040	0.000
30	52.828	6.283	-6.339	8.926	0.120	0.000
31	25.647	35.343	17.697	39.526	0.690	0.000
32	31.321	3.333	3.759	5.024	0.120	0.060

№	a_r^n	a_r^τ	a_e^n	a_e^τ	a_c	a_x	a_y	a
1	5.140	4.712	17.557	0.000	24.825	-10.590	24.825	26.991
2	27.022	18.850	-31.127	0.000	62.329	12.277	-62.329	69.035
3	0.000	1.000	0.114	0.518	0.156	0.593	0.673	1.142
4	146.216	10.472	0.000	0.000	62.832	121.391	62.832	159.489
5	5.849	2.094	1.705	0.000	3.393	-5.722	-3.393	8.168
6	3.290	1.571	1.379	0.000	5.280	0.990	-5.280	6.045
7	29.609	4.712	4.335	0.000	12.262	-21.939	-12.262	34.938
8	29.609	4.712	4.429	0.000	12.396	-22.034	-12.396	35.044
9	29.609	4.712	17.339	0.000	24.525	-34.943	24.525	49.107
10	0.000	5.000	0.436	-1.281	1.202	3.100	-2.483	5.317
11	0.000	1.667	0.012	-0.595	0.033	-0.845	-0.562	1.764
12	0.000	9.000	13.256	4.603	9.002	-10.130	13.605	18.946
13	72.676	28.274	9.874	0.000	10.245	-72.756	-10.245	86.750
14	0.000	0.333	0.000	0.000	0.000	-0.105	0.000	0.333
15	440.607	62.832	220.305	0.000	763.156	-54.415	763.156	869.443
16	72.676	28.274	189.518	0.000	267.906	-118.135	267.906	294.474
17	0.000	2.000	0.461	-0.480	0.000	-0.461	-0.480	2.108
18	1.851	4.712	1.578	0.000	4.465	3.063	-4.465	5.780
19	52.638	25.133	60.861	0.000	121.642	-85.994	-121.642	157.996
20	412.613	75.398	-475.835	0.000	952.280	551.233	952.280	1175.136
21	146.216	10.472	-0.000	0.000	209.440	-121.391	209.440	255.644
22	0.000	0.500	0.000	0.000	0.000	-0.250	0.000	0.500
23	0.000	10.000	11.383	5.082	15.839	-18.454	-10.757	22.501
24	130.553	42.412	17.809	0.000	18.441	-132.937	-18.441	153.626
25	0.822	3.142	0.406	0.000	1.415	1.904	-1.415	3.292
26	16.655	14.137	23.523	0.000	33.288	-45.296	-33.288	56.241
27	93.578	8.378	15.568	0.000	53.979	-69.613	53.979	116.901
28	522.214	84.823	-1425.884	0.000	2470.422	1238.236	2470.422	2807.295
29	0.048	1.571	0.066	0.000	0.089	1.079	0.089	1.527
30	0.647	2.094	-0.761	0.000	1.508	-1.334	-1.508	2.115
31	89.223	28.274	-12.211	0.000	12.623	91.076	12.623	104.855
32	0.000	1.667	0.451	1.879	0.693	-1.894	1.186	2.386