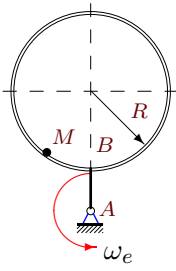
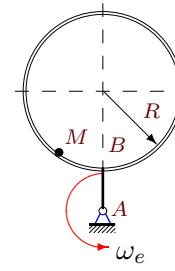
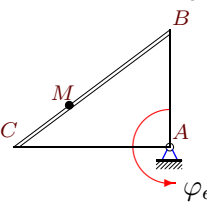
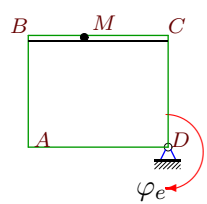
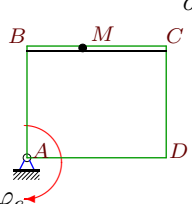
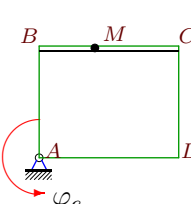
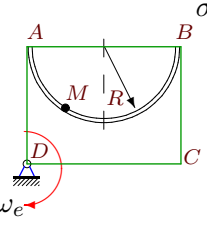
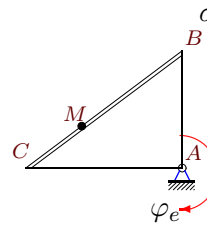
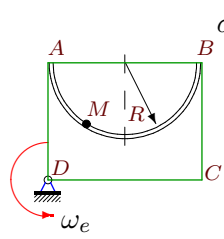


Сложное движение точки, плоская траектория

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

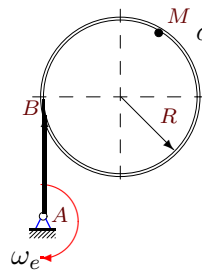
Кирсанов М.Н. **Решбник. Теоретическая механика**/Под ред. А. И. Кириллова. — М.: ФИЗМАТЛИТ, 2002. — 384 с. (с.195.)

<p>Задача 10.1 3</p>  <p>$\sigma(t) = BM = \frac{\pi}{3}(t^2 + 52)$ см.</p> <p>$\omega_e = 0.1$ рад/с, $R = 61$ см, $AB = 2$ см, $t_1 = 3$ с.</p>	<p>Задача 10.2 3</p>  <p>$\sigma(t) = BM = \frac{\pi}{4}(t^2 + 50)$ см.</p> <p>$\omega_e = 0.04$ рад/с, $R = 51$ см, $AB = 2$ см, $t_1 = 1$ с.</p>
<p>Задача 10.3 3</p>  <p>$\sigma(t) = BM = \frac{3}{4}(t^2 + 6t)$ см.</p> <p>$\varphi_e = 0.08t^2$, $AB = 14$ см, $AC = 24$ см, $t_1 = 3$ с.</p>	<p>Задача 10.4 3</p>  <p>$\sigma(t) = BM = \frac{2}{3}(t^3 + 3)$ см.</p> <p>$\varphi_e = 0.28t^2$, $AB = 6$ см, $BC = 11$ см, $t_1 = 2$ с.</p>
<p>Задача 10.5 3</p>  <p>$\sigma(t) = BM = \frac{3}{4}(t^2 + 51)$ см.</p> <p>$\varphi_e = 0.02t^2$, $AB = 28$ см, $BC = 55$ см, $t_1 = 2$ с.</p>	<p>Задача 10.6 3</p>  <p>$\sigma(t) = BM = \frac{1}{2}(t^2 + 2t)$ см.</p> <p>$\varphi_e = 0.4t^2$, $AB = 2$ см, $BC = 3$ см, $t_1 = 1$ с.</p>
<p>Задача 10.7 3</p>  <p>$\sigma(t) = AM = \frac{\pi}{2}(t^3 + 4)$ см.</p> <p>$\omega_e = 1.37$ рад/с, $R = 31$ см, $AD = 33$ см, $t_1 = 3$ с.</p>	<p>Задача 10.8 3</p>  <p>$\sigma(t) = BM = \frac{5}{6}(t^2 + 2t)$ см.</p> <p>$\varphi_e = 0.69t^2$, $AB = 2$ см, $AC = 4$ см, $t_1 = 1$ с.</p>

Задача 10.9

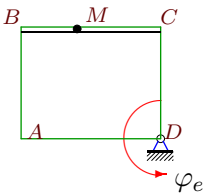
$$\sigma(t) = AM = \frac{\pi}{6}(t^3 + 4) \text{ см.}$$

$$\begin{aligned} \omega_e &= 0.79 \text{ рад/с,} \\ R &= 31 \text{ см,} \\ AD &= 33 \text{ см,} \\ t_1 &= 3 \text{ с.} \end{aligned}$$

Задача 10.10

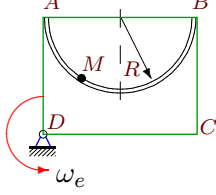
$$\sigma(t) = BM = \frac{4\pi}{3}(t^3 + 3) \text{ см.}$$

$$\begin{aligned} \omega_e &= 2.84 \text{ рад/с,} \\ R &= 11 \text{ см,} \\ AB &= 16 \text{ см,} \\ t_1 &= 2 \text{ с.} \end{aligned}$$

Задача 10.11

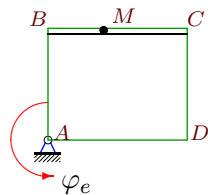
$$\sigma(t) = BM = \frac{1}{4}(t^3 + 4) \text{ см.}$$

$$\begin{aligned} \varphi_e &= 0.04t^2, \\ AB &= 16 \text{ см,} \\ BC &= 31 \text{ см,} \\ t_1 &= 3 \text{ с.} \end{aligned}$$

Задача 10.12

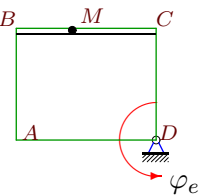
$$\sigma(t) = AM = \frac{\pi}{6}(t^2 + 4t) \text{ см.}$$

$$\begin{aligned} \omega_e &= 0.51 \text{ рад/с,} \\ R &= 12 \text{ см,} \\ AD &= 14 \text{ см,} \\ t_1 &= 2 \text{ с.} \end{aligned}$$

Задача 10.13

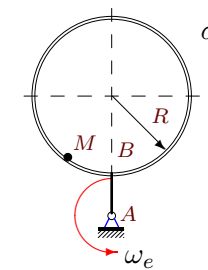
$$\sigma(t) = BM = \frac{1}{3}(t^2 + 51) \text{ см.}$$

$$\begin{aligned} \varphi_e &= 0.01t^2, \\ AB &= 28 \text{ см,} \\ BC &= 55 \text{ см,} \\ t_1 &= 2 \text{ с.} \end{aligned}$$

Задача 10.14

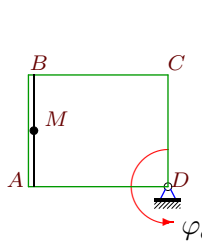
$$\sigma(t) = BM = \frac{1}{4}(t^2 + 6t) \text{ см.}$$

$$\begin{aligned} \varphi_e &= 0.02t^2, \\ AB &= 14 \text{ см,} \\ BC &= 27 \text{ см,} \\ t_1 &= 3 \text{ с.} \end{aligned}$$

Задача 10.15

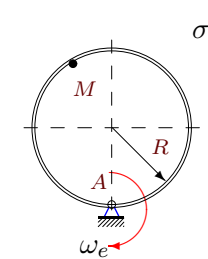
$$\sigma(t) = BM = \frac{2\pi}{3}(t^3 + 2) \text{ см.}$$

$$\begin{aligned} \omega_e &= 0.9 \text{ рад/с,} \\ R &= 3 \text{ см,} \\ AB &= 2 \text{ см,} \\ t_1 &= 1 \text{ с.} \end{aligned}$$

Задача 10.16

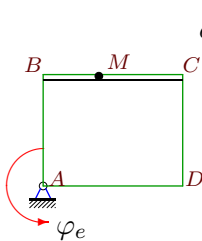
$$\sigma(t) = AM = \frac{5}{6}(t^3 + 3) \text{ см.}$$

$$\begin{aligned} \varphi_e &= 0.16t^2, \\ AB &= 11 \text{ см,} \\ BC &= 13 \text{ см,} \\ t_1 &= 2 \text{ с.} \end{aligned}$$

Задача 10.17

$$\sigma(t) = AM = \frac{3\pi}{4}(t^2 + 4t) \text{ см.}$$

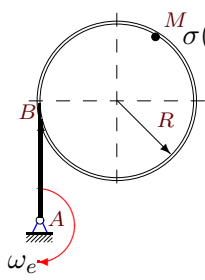
$$\begin{aligned} \omega_e &= 0.85 \text{ рад/с,} \\ R &= 12 \text{ см,} \\ t_1 &= 2 \text{ с.} \end{aligned}$$

Задача 10.18

$$\sigma(t) = BM = \frac{2}{3}(t^2 + 50) \text{ см.}$$

$$\begin{aligned} \varphi_e &= 0.02t^2, \\ AB &= 26 \text{ см,} \\ BC &= 51 \text{ см,} \\ t_1 &= 1 \text{ с.} \end{aligned}$$

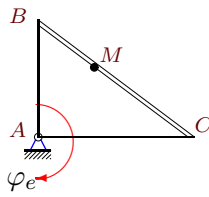
Задача 10.19



$$\sigma(t) = BM = \frac{3\pi}{2}(t^2 + 6t) \text{ см.}$$

$$\begin{aligned} \omega_e &= 2.06 \text{ рад/с,} \\ R &= 27 \text{ см,} \\ AB &= 32 \text{ см,} \\ t_1 &= 3 \text{ с.} \end{aligned}$$

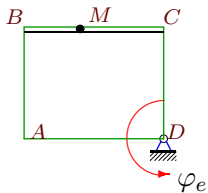
Задача 10.20



$$\sigma(t) = BM = \frac{1}{6}(t^2 + 6t) \text{ см.}$$

$$\begin{aligned} \varphi_e &= 0.03t^2, \\ AB &= 14 \text{ см,} \\ AC &= 24 \text{ см,} \\ t_1 &= 3 \text{ с.} \end{aligned}$$

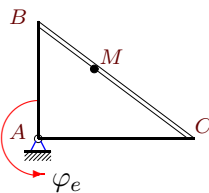
Задача 10.21



$$\sigma(t) = BM = \frac{1}{4}(t^2 + 2)t \text{ см.}$$

$$\begin{aligned} \varphi_e &= 0.21t^2, \\ AB &= 2 \text{ см,} \\ BC &= 3 \text{ см,} \\ t_1 &= 1 \text{ с.} \end{aligned}$$

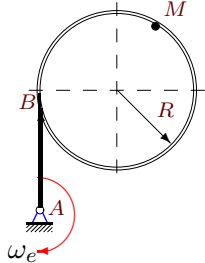
Задача 10.22



$$\sigma(t) = BM = \frac{1}{4}(t^3 + 2) \text{ см.}$$

$$\begin{aligned} \varphi_e &= 0.21t^2, \\ AB &= 2 \text{ см,} \\ AC &= 4 \text{ см,} \\ t_1 &= 1 \text{ с.} \end{aligned}$$

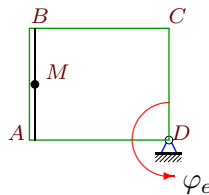
Задача 10.23



$$\sigma(t) = BM = \frac{\pi}{3}(t^3 + 2) \text{ см.}$$

$$\begin{aligned} \omega_e &= 0.29 \text{ рад/с,} \\ R &= 3 \text{ см,} \\ AB &= 8 \text{ см,} \\ t_1 &= 1 \text{ с.} \end{aligned}$$

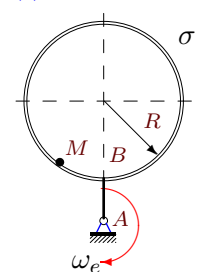
Задача 10.24



$$\sigma(t) = AM = \frac{3}{4}(t^3 + 3) \text{ см.}$$

$$\begin{aligned} \varphi_e &= 0.15t^2, \\ AB &= 11 \text{ см,} \\ BC &= 13 \text{ см,} \\ t_1 &= 2 \text{ с.} \end{aligned}$$

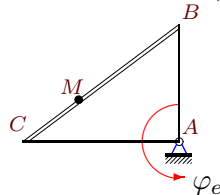
Задача 10.25



$$\sigma(t) = BM = \frac{3\pi}{4}(t^2 + 52) \text{ см.}$$

$$\begin{aligned} \omega_e &= 0.12 \text{ рад/с,} \\ R &= 61 \text{ см,} \\ AB &= 2 \text{ см,} \\ t_1 &= 3 \text{ с.} \end{aligned}$$

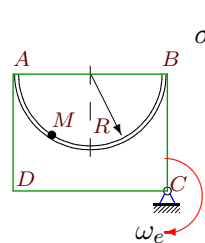
Задача 10.26



$$\sigma(t) = BM = \frac{5}{6}(t^2 + 50) \text{ см.}$$

$$\begin{aligned} \varphi_e &= 0.02t^2, \\ AB &= 26 \text{ см,} \\ AC &= 45 \text{ см,} \\ t_1 &= 1 \text{ с.} \end{aligned}$$

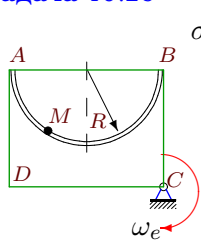
Задача 10.27



$$\sigma(t) = AM = \frac{3\pi}{4}(t^3 + 3) \text{ см.}$$

$$\begin{aligned} \omega_e &= 4.61 \text{ рад/с,} \\ R &= 11 \text{ см,} \\ AD &= 13 \text{ см,} \\ t_1 &= 2 \text{ с.} \end{aligned}$$

Задача 10.28

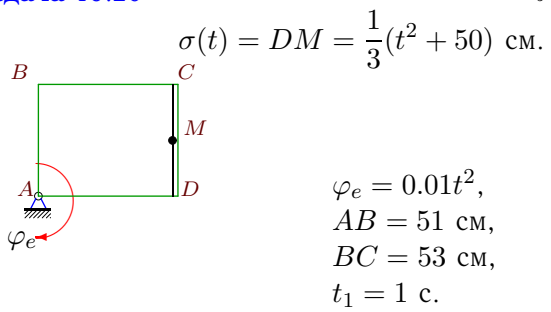


$$\sigma(t) = AM = \frac{\pi}{3}(t^2 + 51) \text{ см.}$$

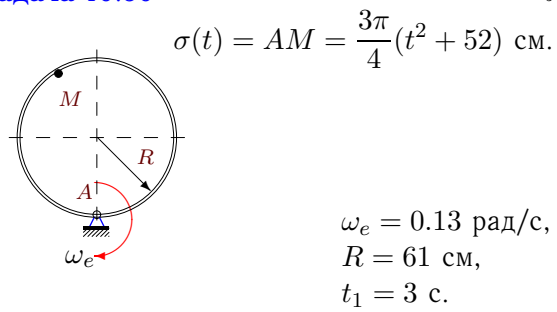
$$\begin{aligned} \omega_e &= 0.05 \text{ рад/с,} \\ R &= 55 \text{ см,} \\ AD &= 57 \text{ см,} \\ t_1 &= 2 \text{ с.} \end{aligned}$$

Задача 10.29

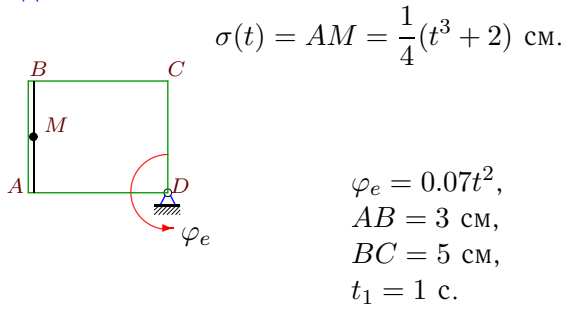
3

**Задача 10.30**

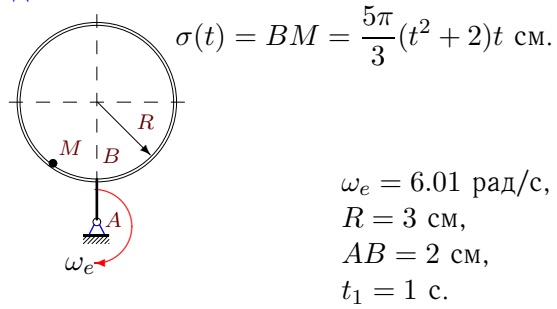
3

**Задача 10.31**

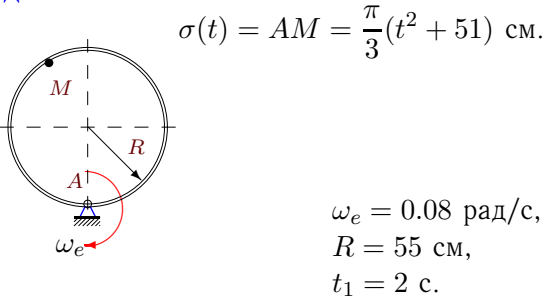
3

**Задача 10.32**

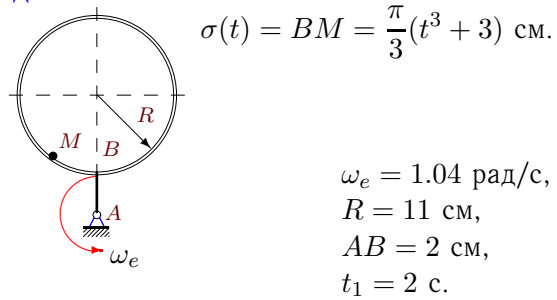
3

**Задача 10.33**

3

**Задача 10.34**

3



Сложное движение точки, плоская траектория

№	R_e	v_r	v_e	v	a_r	a_e	a_c	a
	Радиус, см	Скорости, см/с			Ускорения, см/с ²			
1	62.024	6.283	6.202	6.394	2.192	0.620	1.257	1.580
2	39.842	1.571	1.594	1.819	1.572	0.064	0.126	1.512
3	17.899	9.000	8.591	16.103	1.500	5.021	8.640	13.543
4	7.032	8.000	7.875	15.282	8.000	9.660	17.920	28.319
5	49.855	3.000	3.988	6.193	1.500	2.020	0.480	3.299
6	2.500	2.000	2.000	1.265	1.000	2.561	3.200	3.488
7	31.064	42.412	42.558	61.987	64.546	58.305	116.208	68.781
8	2.404	3.333	3.317	2.378	1.667	5.653	9.200	8.890
9	17.986	14.137	14.209	11.224	11.419	11.225	22.337	27.452
10	17.725	50.265	50.338	76.258	235.128	142.959	285.508	569.717
11	28.223	6.750	6.774	6.293	4.500	2.782	3.240	4.582
12	8.160	4.189	4.162	3.439	1.798	2.122	4.273	5.073
13	33.468	1.333	1.339	0.764	0.667	0.671	0.107	0.435
14	24.618	3.000	2.954	2.765	0.500	1.047	0.720	0.372
15	7.000	6.283	6.300	4.119	18.196	5.670	11.310	11.037
16	15.907	10.000	10.180	6.102	10.000	8.268	12.800	10.615
17	22.173	18.850	18.847	36.972	29.981	16.020	32.044	76.467
18	42.802	1.333	1.712	1.391	1.333	1.713	0.107	1.445
19	27.459	56.549	56.566	72.336	118.810	116.525	232.981	352.714
20	12.360	2.000	2.225	4.202	0.333	0.843	0.720	1.491
21	3.010	1.250	1.264	1.030	1.500	1.371	1.050	1.086
22	1.795	0.750	0.754	0.061	1.500	0.818	0.630	0.815
23	10.704	3.142	3.104	5.904	7.092	0.900	1.822	8.167
24	15.397	9.000	9.238	5.093	9.000	7.215	10.800	8.855
25	114.564	14.137	13.748	27.331	5.739	1.650	3.393	9.145
26	37.103	1.667	1.484	2.825	1.667	1.485	0.133	2.858
27	6.136	28.274	28.286	56.178	77.982	130.398	260.689	314.905
28	83.030	4.189	4.152	4.572	2.119	0.208	0.419	2.285
29	55.660	0.667	1.113	0.520	0.667	1.113	0.027	0.529
30	112.713	14.137	14.653	28.237	5.739	1.905	3.676	9.579
31	5.056	0.750	0.708	0.116	1.500	0.715	0.210	0.815
32	4.359	26.180	26.197	39.103	230.613	157.444	314.683	591.801
33	55.000	4.189	4.400	7.439	2.119	0.352	0.670	2.135
34	12.124	12.566	12.609	14.117	19.079	13.114	26.138	6.926

№	a_r^n	a_r^T	a_e^n	a_e^T	a_x	a_y
1	0.647	2.094	0.620	0.000	-1.047	1.184
2	0.048	1.571	0.064	0.000	-1.108	1.029
3	0.000	1.500	4.124	2.864	6.480	-11.892
4	0.000	8.000	8.821	-3.938	15.959	-23.393
5	0.000	1.500	0.319	-1.994	2.356	-2.309
6	0.000	1.000	1.600	2.000	-1.560	3.120
7	58.024	28.274	58.305	0.000	-29.910	-61.938
8	0.000	1.667	4.578	-3.317	-0.130	8.890
9	6.447	9.425	11.225	0.000	27.048	-4.692
10	229.693	50.265	142.959	0.000	-434.214	368.830
11	0.000	4.500	1.626	2.258	4.559	0.458
12	1.462	1.047	2.122	0.000	5.072	-0.120
13	0.000	0.667	0.054	0.669	0.077	0.429
14	0.000	0.500	0.355	0.985	0.232	-0.292
15	13.159	12.566	5.670	0.000	9.990	4.693
16	0.000	10.000	6.515	5.090	-10.409	2.085
17	29.609	4.712	16.020	0.000	53.058	-55.064
18	0.000	1.333	0.068	1.712	0.239	1.425
19	118.435	9.425	116.525	0.000	-124.002	330.198
20	0.000	0.333	0.400	-0.742	0.503	-1.403
21	0.000	1.500	0.531	1.264	1.057	-0.248
22	0.000	1.500	0.317	0.754	0.806	-0.119
23	3.290	6.283	0.900	0.000	7.871	-2.177
24	0.000	9.000	5.543	4.619	-8.595	2.130
25	3.276	4.712	1.650	0.000	8.669	-2.912
26	0.000	1.667	0.059	1.484	-1.507	-2.429
27	72.676	28.274	130.398	0.000	221.409	-223.927
28	0.319	2.094	0.208	0.000	1.970	-1.157
29	0.000	0.667	0.022	-1.113	0.345	-0.400
30	3.276	4.712	1.905	0.000	8.977	-3.344
31	0.000	1.500	0.099	0.708	-0.217	0.785
32	228.463	31.416	157.444	0.000	-579.929	117.946
33	0.319	2.094	0.352	0.000	0.114	2.132
34	14.356	12.566	13.114	0.000	-6.183	-3.120