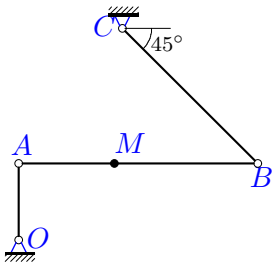
Сложное движение точки, плоское переносное движение

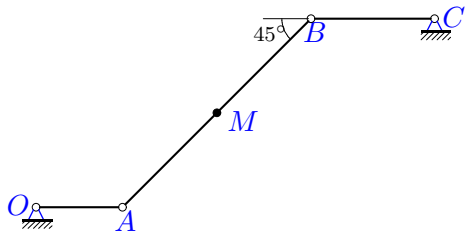
Плоский шарнирно-стержневой механизм приводится в движение кривошипом OA, который вращается против часовой стрелки с постоянной угловой скоростью ω. Вдоль стержня AB движется точка M по закону $AM = \sigma(t)$ или $BM = \sigma(t)$. Положение механизма при $t = t_1$ указано на рисунке. Все размеры даны в смантиметрах. Стержни, положение которых не задано углом, горизонтальны или вертикальны. Найти абсолютную скорость и абсолютное ускорение точки M в этот момент.

Задача К12.1. 9



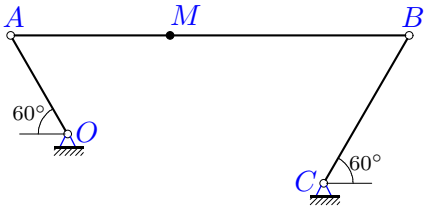
$AM = 10(\sin(\pi t/6) + t^2)$; $t = 3$ с,
$\omega_{OA} = 0.8\ \frac{1}{c}$,
$OA = 80$, $AB = 250$, $BC = 200$

Задача К12.2. 9



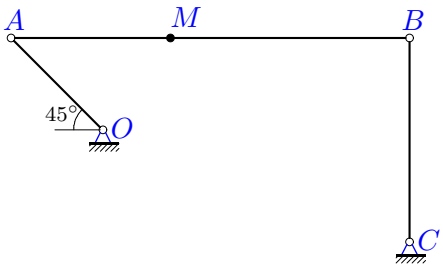
$AM = 6t(2 + \cos(\pi t/3))$; $t = 6$ с,
$\omega_{OA} = 1.3\ \frac{1}{c}$,
$OA = 70$, $AB = 216$, $BC = 100$

Задача К12.3. 9



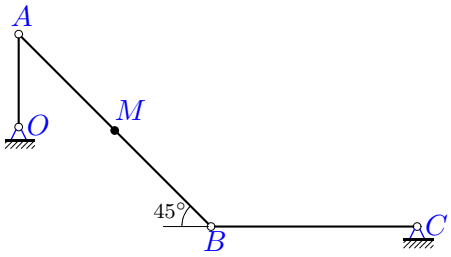
$AM = 10t + 8\sin^2(\pi t/4)$; $t = 2$ с,
$\omega_{OA} = 1.5\ \frac{1}{c}$,
$OA = 20$, $AB = 70$, $BC = 30$

Задача К12.4. 9



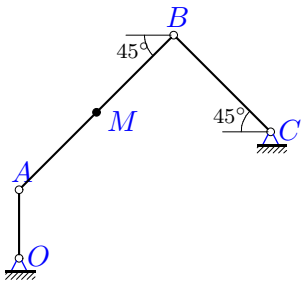
$AM = 27t(3 - t)$; $t = 1$ с,
$\omega_{OA} = 1.6\ \frac{1}{c}$,
$OA = 44$, $AB = 135$, $BC = 69$

Задача К12.5. 9



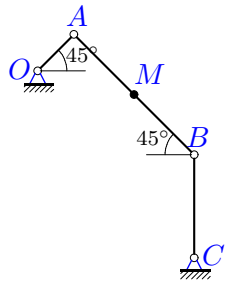
$BM = 11t(8 - t)$; $t = 2$ с,
$\omega_{OA} = 1.5\ \frac{1}{c}$,
$OA = 90$, $AB = 264$, $BC = 200$

Задача К12.6. 9



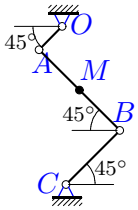
$AM = 16t + 8\sin^2(\pi t/3)$; $t = 3$ с,
$\omega_{OA} = 1.5\ \frac{1}{c}$,
$OA = 30$, $AB = 96$, $BC = 60$

Задача К12.7. 9



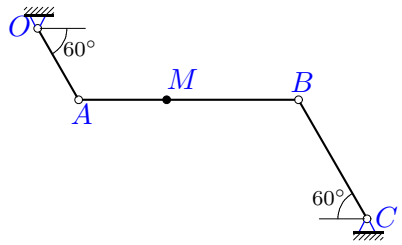
$BM = 11t(2 + \cos(\pi t/3))$; $t = 2$ с,
$\omega_{OA} = 1.2$ $\frac{1}{c}$,
$OA = 20$, $AB = 66$, $BC = 40$

Задача К12.8. 9



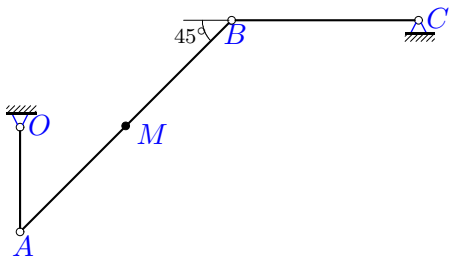
$BM = 7(\sin(\pi t/6) + t^2)$; $t = 1$ с,
$\omega_{OA} = 2.9$ $\frac{1}{c}$,
$OA = 6$, $AB = 21$, $BC = 14$

Задача К12.9. 9



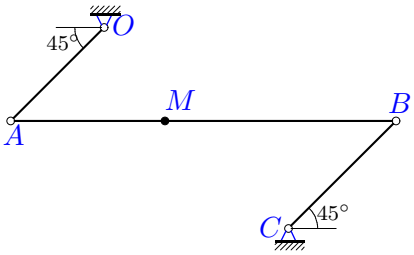
$AM = 12t + 8\sin^2(\pi t/4)$; $t = 2$ с,
$\omega_{OA} = 1.4$ $\frac{1}{c}$,
$OA = 30$, $AB = 80$, $BC = 50$

Задача К12.10. 9



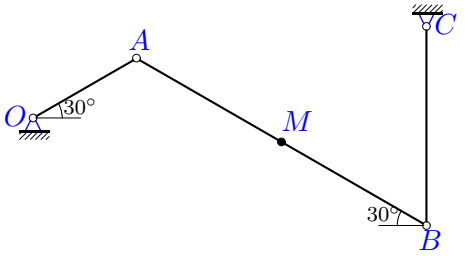
$AM = 20t + 8\sin^2(\pi t/3)$; $t = 3$ с,
$\omega_{OA} = 1.5$ $\frac{1}{c}$,
$OA = 42$, $AB = 120$, $BC = 75$

Задача К12.11. 9



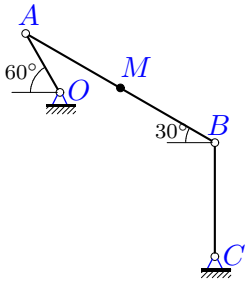
$AM = 14t(2 + \cos(\pi t/3))$; $t = 4$ с,
$\omega_{OA} = 2$ $\frac{1}{c}$,
$OA = 72$, $AB = 210$, $BC = 83$

Задача К12.12. 9



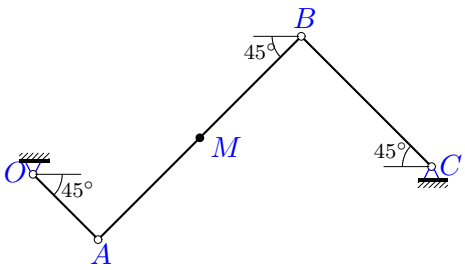
$BM = 7t(8 - t)$; $t = 2$ с,
$\omega_{OA} = 1.5$ $\frac{1}{c}$,
$OA = 60$, $AB = 168$, $BC = 100$

Задача К12.13. 9



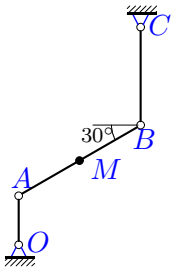
$BM = 8t(8 - t)$; $t = 2$ с,
$\omega_{OA} = 1.5$ $\frac{1}{c}$,
$OA = 60$, $AB = 192$, $BC = 100$

Задача К12.14. 9



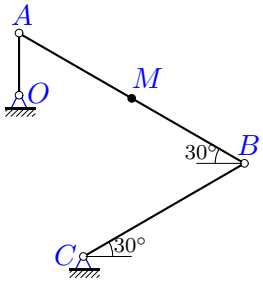
$AM = 13t(5 - t)$; $t = 2$ с,
$\omega_{OA} = 1.3$ $\frac{1}{c}$,
$OA = 50$, $AB = 156$, $BC = 100$

Задача К12.15. 9



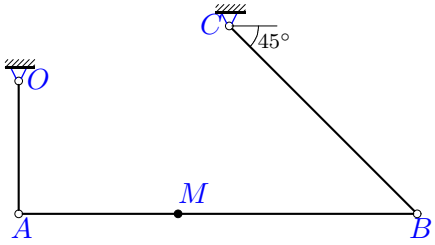
$AM = 8t(2 + \cos(\pi t/3))$; $t = 6$ с,
$\omega_{OA} = 1.2$ $\frac{1}{c}$,
$OA = 100$, $AB = 288$, $BC = 200$

Задача К12.16. 9



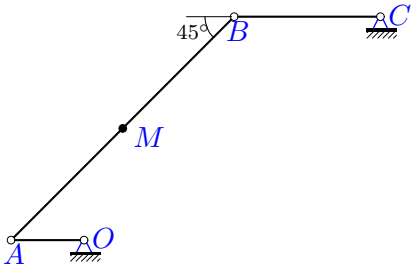
$BM = 14(\sin(\pi t/6) + t^2)$; $t = 1$ с,
$\omega_{OA} = 3.4$ $\frac{1}{c}$,
$OA = 10$, $AB = 42$, $BC = 30$

Задача К12.17. 9



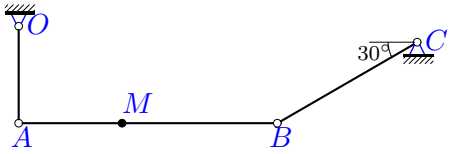
$AM = 12(\sin(\pi t/6) + t^2)$; $t = 3$ с,
$\omega_{OA} = 0.7$ $\frac{1}{c}$,
$OA = 100$, $AB = 300$, $BC = 200$

Задача К12.18. 9



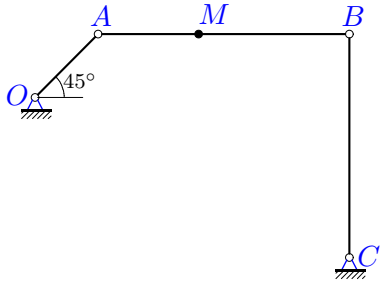
$AM = 12t(2 + \cos(\pi t/3))$; $t = 6$ с,
$\omega_{OA} = 1.4$ $\frac{1}{c}$,
$OA = 100$, $AB = 432$, $BC = 200$

Задача К12.19. 9



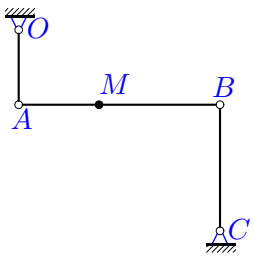
$AM = 12t + 8\sin^2(\pi t/4)$; $t = 2$ с,
$\omega_{OA} = 1.4$ $\frac{1}{c}$,
$OA = 30$, $AB = 80$, $BC = 50$

Задача К12.20. 9



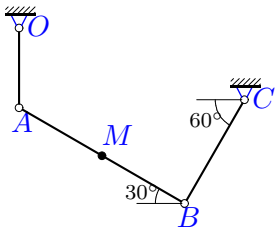
$AM = 9(\sin(\pi t/6) + t^2)$; $t = 3$ с,
$\omega_{OA} = 0.7$ $\frac{1}{c}$,
$OA = 80$, $AB = 225$, $BC = 200$

Задача К12.21. 9



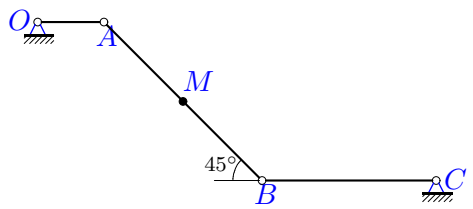
$AM = 18t + 8\sin^2(\pi t/4)$; $t = 2$ с,
$\omega_{OA} = 1.4$ $\frac{1}{c}$,
$OA = 41$, $AB = 110$, $BC = 69$

Задача К12.22. 9



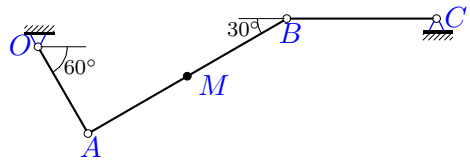
$BM = 8t(2 + \cos(\pi t/3))$; $t = 2$ с,
$\omega_{OA} = 1.1$ $\frac{1}{c}$,
$OA = 20$, $AB = 48$, $BC = 30$

Задача К12.23. 9



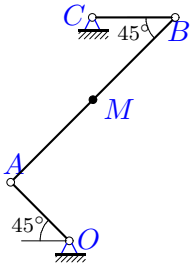
$BM = 9(\sin(\pi t/6) + t^2)$; $t = 1$ с,
$\omega_{OA} = 2.8\ \frac{1}{c}$,
$OA = 8,\ AB = 27,\ BC = 21$

Задача К12.24. 9



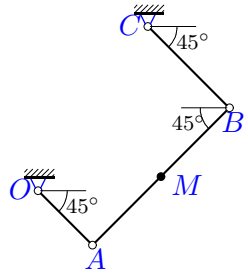
$AM = 9(\sin(\pi t/6) + t^2)$; $t = 5$ с,
$\omega_{OA} = 0.4\ \frac{1}{c}$,
$OA = 200,\ AB = 459,\ BC = 300$

Задача К12.25. 9



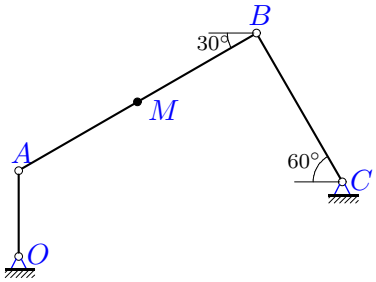
$AM = 11(\sin(\pi t/6) + t^2)$; $t = 5$ с,
$\omega_{OA} = 0.5\ \frac{1}{c}$,
$OA = 200,\ AB = 561,\ BC = 200$

Задача К12.26. 9



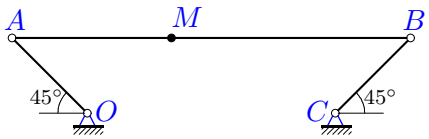
$AM = 14t(2 + \cos(\pi t/3))$; $t = 6$ с,
$\omega_{OA} = 1.2\ \frac{1}{c}$,
$OA = 200,\ AB = 504,\ BC = 300$

Задача К12.27. 9



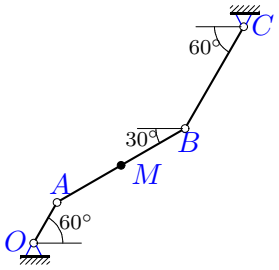
$AM = 24t(3 - t)$; $t = 1$ с,
$\omega_{OA} = 1.8\ \frac{1}{c}$,
$OA = 30,\ AB = 96,\ BC = 60$

Задача К12.28. 9



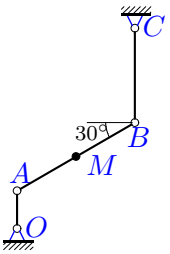
$AM = 15(\sin(\pi t/6) + t^2)$; $t = 3$ с,
$\omega_{OA} = 0.9\ \frac{1}{c}$,
$OA = 100,\ AB = 375,\ BC = 100$

Задача К12.29. 9



$AM = 7t(2 + \cos(\pi t/3))$; $t = 6$ с,
$\omega_{OA} = 1.3\ \frac{1}{c}$,
$OA = 80,\ AB = 252,\ BC = 200$

Задача К12.30. 9



$AM = 12t + 8\sin^2(\pi t/3)$; $t = 3$ с,
$\omega_{OA} = 1.6\ \frac{1}{c}$,
$OA = 20,\ AB = 72,\ BC = 50$

К12 **Ответы.**

Сложное движение точки, плоское переносное движение

07.04.2012

№	ω_e	ε_e	v_r^τ	v_{xe}	v_{ye}	v_e	v	a_r^τ	a_e	a_C	a
1	−0.256	0.371	60.00	−64.00	−25.60	68.930	25.911	17.258	15.55	30.72	46.084
2	0.000	−1.317	18.00	0.00	91.00	91.000	104.506	−39.478	102.11	0.00	136.343
3	0.429	−0.018	10.00	−25.98	−3.00	26.153	16.260	−9.870	43.11	8.57	31.789
4	0.369	0.324	27.00	−49.78	−29.87	58.053	37.564	−54.000	95.35	19.91	46.039
5	0.723	1.011	−44.00	−67.50	67.50	95.459	139.459	22.000	74.79	63.64	120.944
6	−0.331	0.321	16.00	−33.75	−11.25	35.576	22.436	17.546	62.07	10.61	55.663
7	−0.364	−0.313	3.45	−25.46	8.49	26.833	23.796	7.889	39.37	2.51	41.788
8	0.000	−3.433	−17.17	12.30	−12.30	17.400	0.226	−13.040	14.42	0.00	19.440
9	0.000	−1.358	12.00	36.37	21.00	42.000	52.735	−9.870	30.33	0.00	39.974
10	0.742	−1.175	20.00	31.50	31.50	44.548	64.548	17.546	33.95	29.70	57.517
11	−0.000	−3.622	71.79	101.82	−101.82	144.000	201.267	56.099	227.14	0.00	278.545
12	−0.536	0.855	−28.00	−67.50	38.97	77.942	105.942	14.000	102.11	30.00	79.062
13	0.271	0.498	−32.00	−64.95	−22.50	68.739	92.892	16.000	111.62	17.32	131.198
14	−0.000	−0.812	13.00	45.96	45.96	65.000	78.000	−26.000	21.13	0.00	33.500
15	0.000	0.866	24.00	−120.00	0.00	120.000	99.938	−52.638	72.00	0.00	124.638
16	0.810	0.908	−34.35	−25.50	14.72	29.445	63.793	−26.081	92.24	55.61	137.830
17	0.233	0.013	72.00	70.00	28.00	75.392	144.734	20.710	51.01	33.60	85.371
18	0.000	0.321	36.00	0.00	−140.00	140.000	117.339	−78.957	154.95	0.00	91.425
19	−0.909	4.225	12.00	42.00	−29.10	51.095	61.341	−9.870	195.80	21.82	175.973
20	−0.176	0.088	54.00	−39.60	23.76	46.179	27.783	15.533	36.35	19.01	41.565
21	0.000	−1.165	18.00	57.40	−0.00	57.400	75.400	−9.870	29.12	0.00	30.743
22	−0.229	−0.185	2.51	19.25	−4.76	19.831	22.253	5.737	21.25	1.15	17.164
23	0.000	4.537	−22.08	0.00	22.40	22.400	41.095	−16.766	47.46	0.00	63.408
24	0.302	−0.599	85.92	34.64	100.00	105.830	179.803	16.766	107.61	51.87	53.844
25	−0.178	0.309	105.01	−35.36	−106.07	111.803	50.251	20.492	37.86	37.44	11.597
26	0.000	−0.190	42.00	169.71	169.71	240.000	282.000	−92.116	240.00	0.00	257.071
27	−0.281	0.497	24.00	−47.25	−11.69	48.675	26.467	−48.000	79.89	13.50	124.611
28	0.339	−0.190	90.00	−63.64	−12.73	64.900	29.272	25.888	94.68	61.09	70.369
29	0.000	1.502	21.00	−90.07	52.00	104.000	95.252	−46.058	168.86	0.00	203.525
30	0.000	1.150	12.00	−32.00	0.00	32.000	22.425	17.546	25.77	0.00	8.579

K12 файл o12k9A

№	a_{xr}	a_{yr}	a_{xe}	a_{ye}	a_x	a_y
1	17.258	0.000	-6.554	-14.103	10.705	-44.823
2	-27.915	-27.915	-17.745	-100.555	-45.660	-128.470
3	-9.870	0.000	17.357	-39.466	7.488	-30.895
4	-54.000	0.000	72.306	-62.155	18.306	-42.243
5	15.556	-15.556	45.563	-59.309	16.119	-119.865
6	12.407	12.407	-14.638	-60.320	5.269	-55.413
7	5.578	-5.578	-30.753	-24.582	-26.950	-31.936
8	-9.221	9.221	10.194	10.194	0.973	19.415
9	-9.870	0.000	-29.400	7.469	-39.270	7.469
10	12.407	12.407	26.460	21.265	17.867	54.672
11	56.099	0.000	203.647	-100.597	259.745	-100.597
12	12.124	-7.000	-101.882	6.750	-74.757	25.731
13	13.856	-8.000	85.337	-71.957	90.533	-94.957
14	-18.385	-18.385	-14.938	14.938	-33.322	-3.447
15	-45.586	-26.319	-62.354	-36.000	-107.940	-62.319
16	-22.587	13.040	-2.384	-92.205	-52.776	-127.325
17	20.710	0.000	-6.533	50.585	14.177	84.185
18	-55.831	-55.831	147.000	49.000	91.169	-6.831
19	-9.870	0.000	-26.460	194.006	-36.330	172.182
20	15.533	0.000	-30.506	-19.767	-14.974	-38.774
21	-9.870	0.000	0.000	29.116	-9.870	29.116
22	4.969	-2.869	-3.306	20.995	1.087	17.130
23	-11.856	11.856	-19.413	43.307	-31.269	55.162
24	14.520	8.383	34.667	-101.874	23.249	-48.566
25	14.490	14.490	-32.322	19.718	8.640	7.736
26	-65.136	-65.136	-169.706	169.706	-234.842	104.570
27	-41.569	-24.000	-15.220	-78.432	-50.039	-114.123
28	25.888	0.000	39.996	-85.816	65.883	-24.722
29	-39.888	-23.029	-162.240	46.835	-202.128	23.806
30	15.195	8.773	-20.692	-15.360	-5.497	-6.587