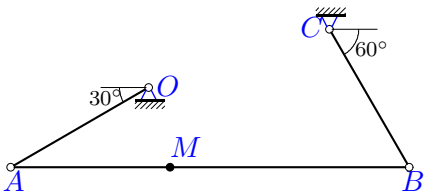
Сложное движение точки, плоское переносное движение

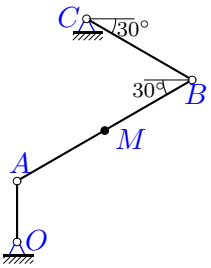
Плоский шарнирно-стержневой механизм приводится в движение кривошипом OA, который вращается против часовой стрелки с постоянной угловой скоростью ω. Вдоль стержня AB движется точка M по закону $AM = \sigma(t)$ или $BM = \sigma(t)$. Положение механизма при $t = t_1$ указано на рисунке. Все размеры даны 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. 2



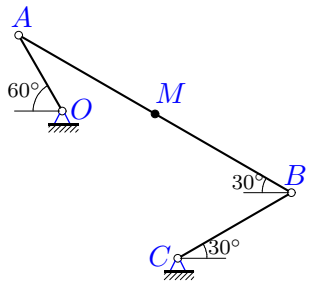
$AM = 5t(5 - t)$; $t = 2$ с,
$\omega_{OA} = 1.2\ \frac{1}{c}$,
$OA = 30$, $AB = 75$, $BC = 30$

Задача К12.2. 2



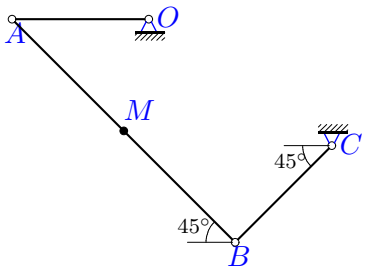
$AM = 13(\sin(\pi t/6) + t^2)$; $t = 5$ с,
$\omega_{OA} = 0.6\ \frac{1}{c}$,
$OA = 200$, $AB = 663$, $BC = 400$

Задача К12.3. 2



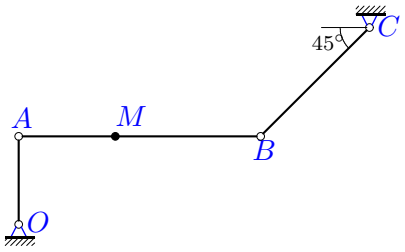
$BM = 12t(2 + \cos(\pi t/3))$; $t = 2$ с,
$\omega_{OA} = 1.2\ \frac{1}{c}$,
$OA = 20$, $AB = 72$, $BC = 30$

Задача К12.4. 2



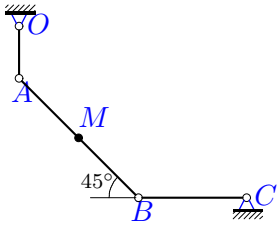
$BM = 7t(14 - t)$; $t = 3$ с,
$\omega_{OA} = 1.3\ \frac{1}{c}$,
$OA = 200$, $AB = 462$, $BC = 200$

Задача К12.5. 2



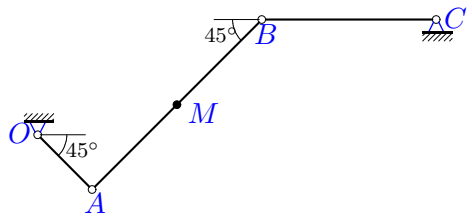
$AM = 18t + 8\sin^2(\pi t/4)$; $t = 2$ с,
$\omega_{OA} = 1.4\ \frac{1}{c}$,
$OA = 40$, $AB = 110$, $BC = 70$

Задача К12.6. 2



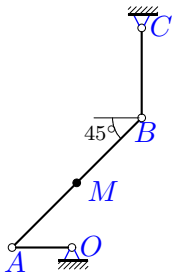
$BM = 13(\sin(\pi t/6) + t^2)$; $t = 1$ с,
$\omega_{OA} = 2.7\ \frac{1}{c}$,
$OA = 12$, $AB = 39$, $BC = 25$

Задача К12.7. 2



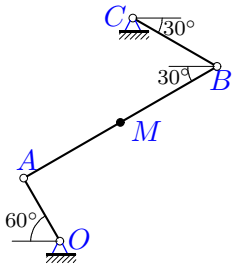
$AM = 14t + 8\sin^2(\pi t/3)$; $t = 3$ с,
$\omega_{OA} = 1.5\ \frac{1}{c}$,
$OA = 27,\ AB = 84,\ BC = 61$

Задача К12.8. 2



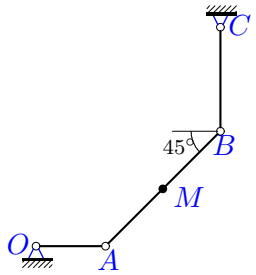
$AM = 12(\sin(\pi t/6) + t^2)$; $t = 5$ с,
$\omega_{OA} = 0.6\ \frac{1}{c}$,
$OA = 200,\ AB = 612,\ BC = 300$

Задача К12.9. 2



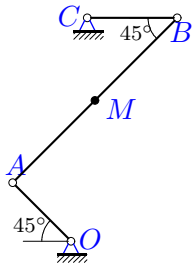
$AM = 23t(3 - t)$; $t = 1$ с,
$\omega_{OA} = 1.8\ \frac{1}{c}$,
$OA = 30,\ AB = 92,\ BC = 40$

Задача К12.10. 2



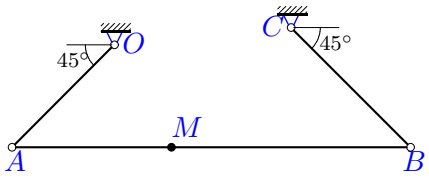
$AM = 13t(2 + \cos(\pi t/3))$; $t = 6$ с,
$\omega_{OA} = 1.2\ \frac{1}{c}$,
$OA = 200,\ AB = 468,\ BC = 300$

Задача К12.11. 2



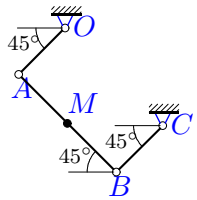
$AM = 31t(3 - t)$; $t = 1$ с,
$\omega_{OA} = 1.7\ \frac{1}{c}$,
$OA = 44,\ AB = 124,\ BC = 48$

Задача К12.12. 2



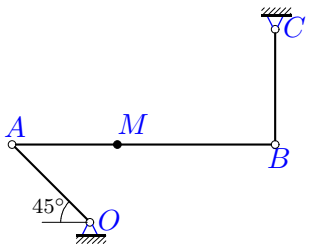
$AM = 11t(5 - t)$; $t = 2$ с,
$\omega_{OA} = 1.2\ \frac{1}{c}$,
$OA = 60,\ AB = 165,\ BC = 70$

Задача К12.13. 2



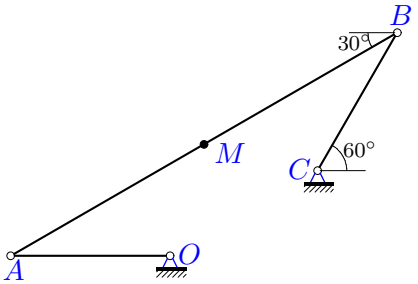
$BM = 7(\sin(\pi t/6) + t^2)$; $t = 1$ с,
$\omega_{OA} = 1.7\ \frac{1}{c}$,
$OA = 10,\ AB = 21,\ BC = 10$

Задача К12.14. 2



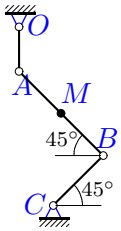
$AM = 7t(2 + \cos(\pi t/3))$; $t = 4$ с,
$\omega_{OA} = 1.8\ \frac{1}{c}$,
$OA = 44,\ AB = 105,\ BC = 46$

Задача К12.15. 2



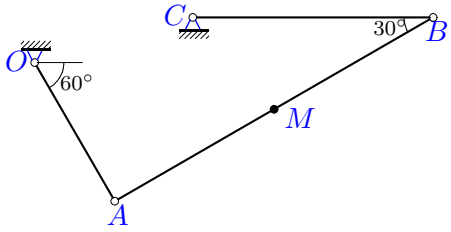
$AM = 7t(5-t)$; $t = 2$ с,
$\omega_{OA} = 1.2\ \frac{1}{c}$,
$OA = 30$, $AB = 84$, $BC = 30$

Задача К12.16. 2



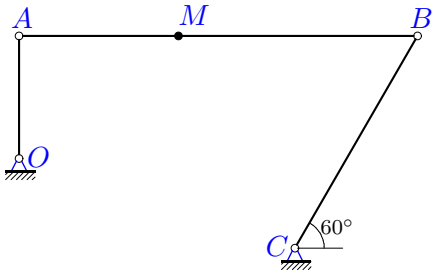
$BM = 14t + 8\sin^2(\pi t/6)$; $t = 1$ с,
$\omega_{OA} = 2.5\ \frac{1}{c}$,
$OA = 12$, $AB = 32$, $BC = 19$

Задача К12.17. 2



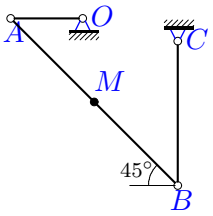
$AM = 9(\sin(\pi t/6) + t^2)$; $t = 5$ с,
$\omega_{OA} = 0.4\ \frac{1}{c}$,
$OA = 200$, $AB = 459$, $BC = 300$

Задача К12.18. 2



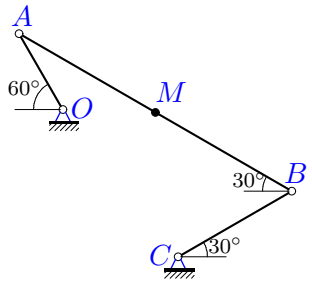
$AM = 13(\sin(\pi t/6) + t^2)$; $t = 3$ с,
$\omega_{OA} = 0.8\ \frac{1}{c}$,
$OA = 100$, $AB = 325$, $BC = 200$

Задача К12.19. 2



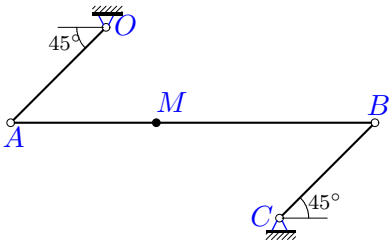
$BM = 12(\sin(\pi t/6) + t^2)$; $t = 1$ с,
$\omega_{OA} = 2.7\ \frac{1}{c}$,
$OA = 11$, $AB = 36$, $BC = 22$

Задача К12.20. 2



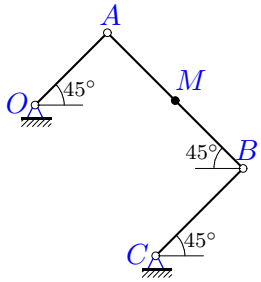
$BM = 12t(2 + \cos(\pi t/3))$; $t = 2$ с,
$\omega_{OA} = 1.2\ \frac{1}{c}$,
$OA = 20$, $AB = 72$, $BC = 30$

Задача К12.21. 2



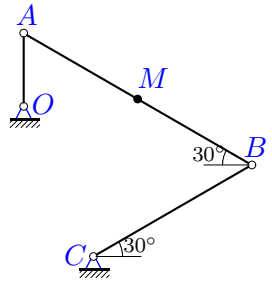
$AM = 9t(2 + \cos(\pi t/3))$; $t = 4$ с,
$\omega_{OA} = 1.9\ \frac{1}{c}$,
$OA = 50$, $AB = 135$, $BC = 50$

Задача К12.22. 2



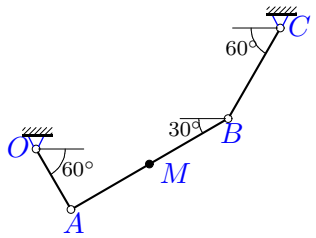
$BM = 15(\sin(\pi t/6) + t^2)$; $t = 1$ с,
$\omega_{OA} = 1.5\ \frac{1}{c}$,
$OA = 24$, $AB = 45$, $BC = 29$

Задача К12.23. 2



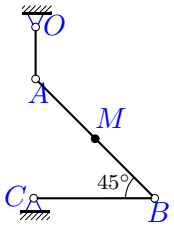
$BM = 12t(2 + \cos(\pi t/3))$; $t = 2$ с,
$\omega_{OA} = 1.2$ $\frac{1}{c}$,
$OA = 20$, $AB = 72$, $BC = 50$

Задача К12.24. 2



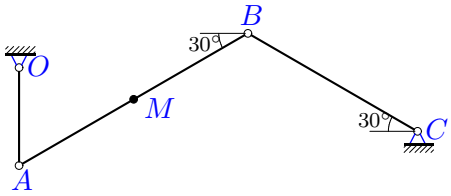
$AM = 13t(3 - t)$; $t = 1$ с,
$\omega_{OA} = 1.6$ $\frac{1}{c}$,
$OA = 20$, $AB = 52$, $BC = 30$

Задача К12.25. 2



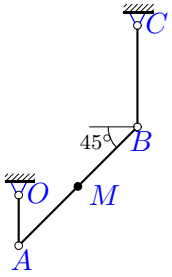
$BM = 13(\sin(\pi t/6) + t^2)$; $t = 1$ с,
$\omega_{OA} = 2.7$ $\frac{1}{c}$,
$OA = 12$, $AB = 39$, $BC = 28$

Задача К12.26. 2



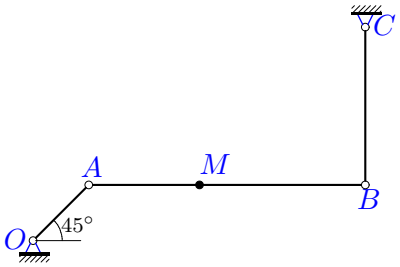
$AM = 15t(2 + \cos(\pi t/3))$; $t = 6$ с,
$\omega_{OA} = 1.2$ $\frac{1}{c}$,
$OA = 200$, $AB = 540$, $BC = 400$

Задача К12.27. 2



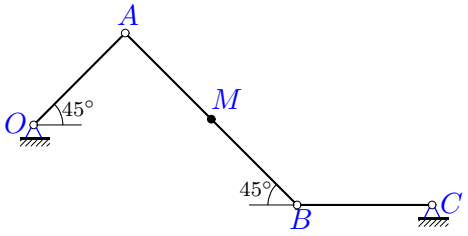
$AM = 13(\sin(\pi t/6) + t^2)$; $t = 5$ с,
$\omega_{OA} = 0.6$ $\frac{1}{c}$,
$OA = 200$, $AB = 663$, $BC = 400$

Задача К12.28. 2



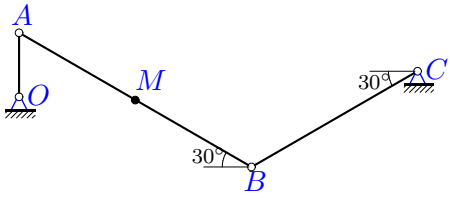
$AM = 14(\sin(\pi t/6) + t^2)$; $t = 3$ с,
$\omega_{OA} = 0.8$ $\frac{1}{c}$,
$OA = 100$, $AB = 350$, $BC = 200$

Задача К12.29. 2



$BM = 15(\sin(\pi t/6) + t^2)$; $t = 1$ с,
$\omega_{OA} = 1.5$ $\frac{1}{c}$,
$OA = 24$, $AB = 45$, $BC = 25$

Задача К12.30. 2



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

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	0.554	0.044	5.00	18.00	−14.55	23.145	27.215	−10.000	36.34	5.54	33.791
2	−0.181	0.106	124.11	−90.00	−51.96	103.923	20.182	24.218	54.11	44.92	75.457
3	0.385	−0.017	3.77	−13.86	−0.00	13.856	10.761	8.606	24.70	2.90	30.706
4	0.398	−0.152	−56.00	65.00	−195.00	205.548	157.464	14.000	287.39	44.57	268.807
5	0.509	2.124	18.00	−56.00	22.40	60.314	44.111	−9.870	18.88	18.33	39.579
6	−1.175	2.903	−31.89	16.20	−16.20	22.910	8.985	−24.218	148.04	74.95	223.999
7	0.482	−1.861	14.00	14.32	42.96	45.280	58.140	17.546	19.97	13.50	8.712
8	0.277	0.188	114.56	−60.00	−60.00	84.853	29.706	22.355	28.16	63.53	85.946
9	−0.339	2.210	23.00	−38.97	−40.50	56.205	34.699	−46.000	6.92	15.59	52.474
10	−0.725	1.106	39.00	120.00	120.00	169.706	208.706	−85.537	566.25	56.57	578.558
11	−0.603	3.320	31.00	−26.45	−79.34	83.629	57.595	−62.000	81.87	37.40	94.109
12	0.617	0.254	11.00	50.91	−10.18	51.920	62.743	−22.000	85.76	13.58	92.489
13	0.000	−0.000	−17.17	12.02	−12.02	17.000	0.174	−13.040	28.90	0.00	31.706
14	0.533	1.609	35.89	−56.00	−33.60	65.310	39.160	28.049	94.86	38.29	117.017
15	0.742	−0.588	7.00	−15.59	−9.00	18.000	11.000	−14.000	48.46	10.39	35.924
16	−0.663	−2.397	−17.63	22.50	−7.50	23.717	11.196	−2.193	61.83	23.37	72.962
17	0.302	0.144	85.92	34.64	100.00	105.830	179.803	16.766	68.38	51.87	117.056
18	0.142	0.057	78.00	−80.00	18.48	82.106	18.583	22.436	56.65	22.17	39.714
19	1.167	2.157	−29.44	14.85	−14.85	21.001	8.440	−22.355	100.81	68.70	28.575
20	0.385	−0.017	3.77	−13.86	−0.00	13.856	10.761	8.606	24.70	2.90	30.706
21	0.000	−3.782	46.15	67.18	−67.18	95.000	131.737	36.063	148.84	0.00	180.723
22	−0.000	0.207	−36.80	−25.46	25.46	36.000	72.802	−27.944	49.34	0.00	56.708
23	0.333	0.110	3.77	−18.00	10.39	20.785	17.019	8.606	23.41	2.51	26.495
24	−1.066	6.234	13.00	41.57	−8.00	42.332	52.849	−26.000	215.33	27.71	193.715
25	−1.175	0.021	−31.89	16.20	−16.20	22.910	8.985	−24.218	108.43	74.95	177.747
26	0.444	−0.730	45.00	180.00	103.92	207.846	252.846	−98.696	104.69	40.00	92.695
27	−0.000	−0.077	124.11	120.00	−0.00	120.000	225.529	24.218	56.92	0.00	79.325
28	−0.162	0.175	84.00	−56.57	33.94	65.970	43.640	24.162	53.13	27.15	53.922
29	0.800	5.098	−36.80	−12.73	38.18	40.249	74.994	−27.944	62.40	58.88	42.383
30	0.810	3.027	−34.35	−25.50	14.72	29.445	63.793	−26.081	57.23	55.61	93.894

K12 файл o12k2A

№	a_{xr}	a_{yr}	a_{xe}	a_{ye}	a_x	a_y
1	-10.000	0.000	28.196	22.930	18.196	28.473
2	20.973	12.109	-27.054	-46.860	16.381	-73.657
3	7.453	-4.303	9.473	-22.808	18.376	-24.601
4	9.899	-9.899	287.384	1.117	265.769	-40.298
5	-9.870	0.000	-11.404	15.049	-21.273	33.376
6	-17.125	17.125	20.995	146.541	56.865	216.661
7	12.407	12.407	5.411	-19.218	8.272	2.734
8	15.807	15.807	14.724	24.000	-14.393	84.732
9	-39.837	-23.000	-6.809	1.229	-38.852	-35.271
10	-60.483	-60.483	-558.057	96.000	-578.541	-4.483
11	-43.841	-43.841	-71.605	39.700	-89.000	-30.587
12	-22.000	0.000	35.959	77.853	13.959	91.429
13	-9.221	9.221	20.435	20.435	11.214	29.656
14	28.049	0.000	88.857	-33.211	116.907	5.077
15	-12.124	-7.000	35.515	-32.976	18.195	-30.976
16	-1.551	1.551	-32.095	52.848	-17.120	70.925
17	14.520	8.383	-50.667	45.927	-62.084	99.235
18	22.436	0.000	-2.626	-56.591	19.810	-34.421
19	-15.807	15.807	90.316	44.778	25.930	12.007
20	7.453	-4.303	9.473	-22.808	18.376	-24.601
21	36.063	0.000	127.633	-76.580	163.696	-76.580
22	-19.759	19.759	-34.892	-34.892	-54.651	-15.133
23	7.453	-4.303	-1.478	-23.360	7.230	-25.489
24	-22.517	-13.000	-132.229	169.950	-140.889	132.950
25	-17.125	17.125	-18.746	106.801	17.124	176.920
26	-85.473	-49.348	52.346	90.667	-53.127	75.960
27	17.125	17.125	18.000	54.000	35.125	71.125
28	24.162	0.000	-48.912	-20.753	-24.750	-47.906
29	-19.759	19.759	32.748	53.113	-28.648	31.236
30	-22.587	13.040	19.864	-53.671	-30.529	-88.792