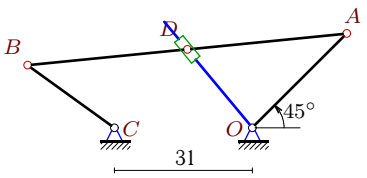
Механизм с муфтой (1)

Плоский механизм с одной степенью свободы состоит из шарнирно соединенных стержней и муфты, скользящей по направляющему стержню и шарнирно закрепленной на другом стержне или вращающейся на неподвижном шарнире. Кривошип OA вращается против часовой стрелки с постоянной угловой скоростью ω_{OA}. Горизонтальные и вертикальные размеры на рисунках даны для неподвижных шарниров и для линий движения ползунов (в см). Найти скорость муфты D (или E) относительно направляющего стержня (в см/с).

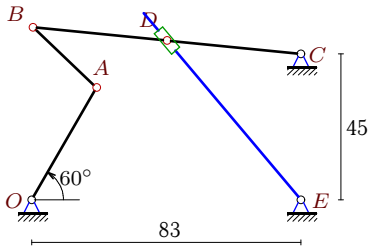
Кирсанов М.Н. **Решебник. Теоретическая механика**/Под ред. А. И. Кириллова.– М.: ФИЗМАТЛИТ, 2008. — 384 с. (с.216.)

Задача К13.1. *10*



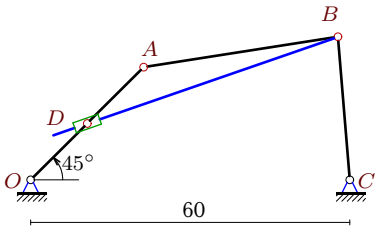
$\omega_{OA} = 9\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 72$, $BC = 24$, $AD{=}AB/2$.

Задача К13.2. *10*



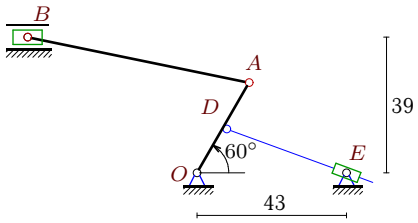
$\omega_{OA} = 3\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 27$, $BC = 83$, $BD{=}BC/2$.

Задача К13.3. *10*



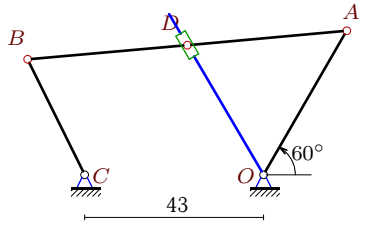
$\omega_{OA} = 9\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 37$, $BC = 27$, $OD{=}OA/2$.

Задача К13.4. *10*



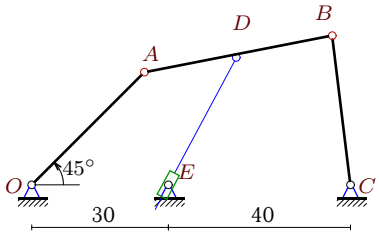
$\omega_{OA} = 5\frac{1}{c}$, $\alpha = 60°$, $OA = 30$,
$AB = 65$, $OD{=}OA/2$.

Задача К13.5. *10*



$\omega_{OA} = 17\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 77$, $BC = 31$, $AD{=}AB/2$.

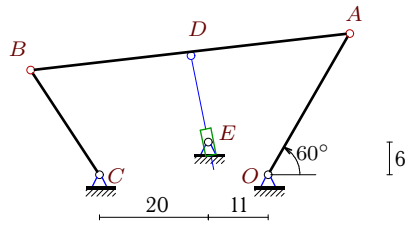
Задача К13.6. *10*



$\omega_{OA} = 31\frac{1}{c}$, $\alpha = 45°$, $OA = 35$,
$AB = 42$, $BC = 33$, $AD{=}AB/2$.

Задача К13.7.

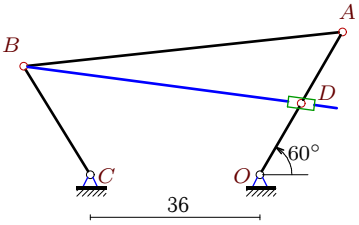
10



$\omega_{OA} = 31\frac{1}{c}$, $\alpha = 60°$, $OA = 30$,
$AB = 59$, $BC = 23$, AD=$AB/2$.

Задача К13.8.

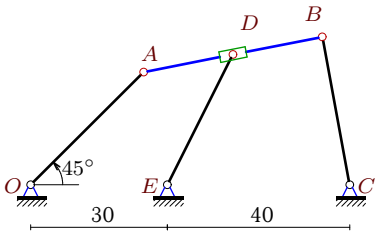
10



$\omega_{OA} = 2\frac{1}{c}$, $\alpha = 60°$, $OA = 35$,
$AB = 68$, $BC = 27$, OD=$OA/2$.

Задача К13.9.

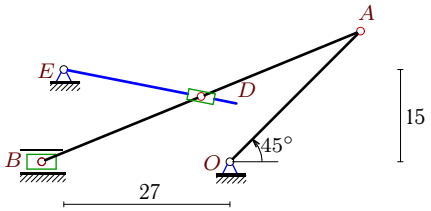
10



$\omega_{OA} = 16\frac{1}{c}$, $\alpha = 45°$, $OA = 35$,
$AB = 40$, $BC = 33$, AD=$AB/2$.

Задача К13.10.

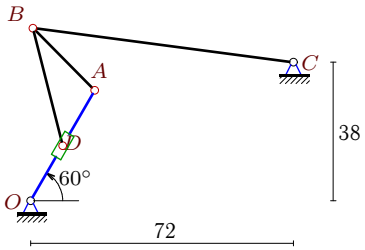
10



$\omega_{OA} = 5\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 56$, AD=$AB/2$.

Задача К13.11.

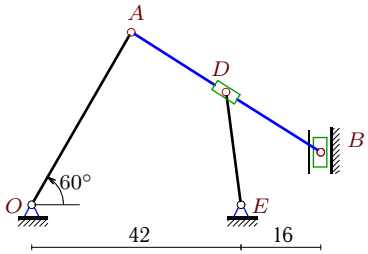
10



$\omega_{OA} = 23\frac{1}{c}$, $\alpha = 60°$, $OA = 35$,
$AB = 24$, $BC = 72$, OD=$OA/2$.

Задача К13.12.

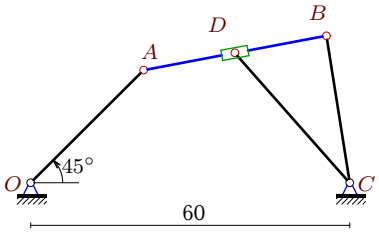
10



$\omega_{OA} = 14\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 45$, AD=$AB/2$.

Задача К13.13.

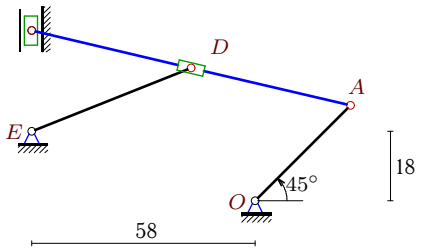
10



$\omega_{OA} = 29\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 35$, $BC = 28$, AD=$AB/2$.

Задача К13.14.

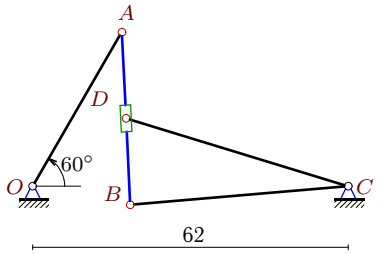
10



$\omega_{OA} = 32\frac{1}{c}$, $\alpha = 45°$, $OA = 35$,
$AB = 85$, AD=$AB/2$.

Задача К13.15.

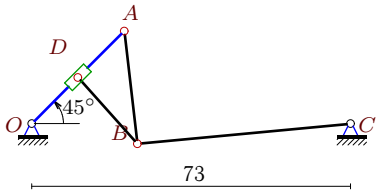
10



$\omega_{OA} = 15\frac{1}{c}$, $\alpha = 60°$, $OA = 35$,
$AB = 34$, $BC = 43$, $AD{=}AB/2$.

Задача К13.16.

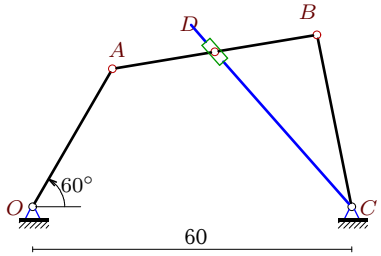
10



$\omega_{OA} = 33\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 26$, $BC = 49$, $OD{=}OA/2$.

Задача К13.17.

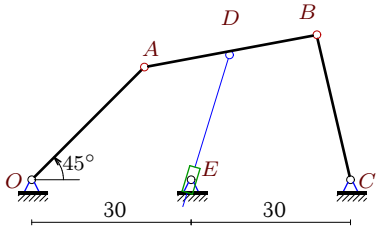
10



$\omega_{OA} = 16\frac{1}{c}$, $\alpha = 60°$, $OA = 30$,
$AB = 39$, $BC = 33$, $AD{=}AB/2$.

Задача К13.18.

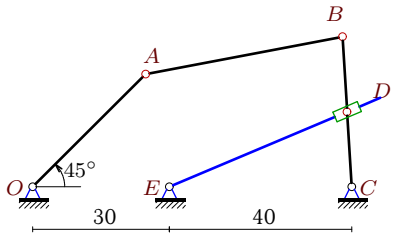
10



$\omega_{OA} = 12\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 33$, $BC = 28$, $AD{=}AB/2$.

Задача К13.19.

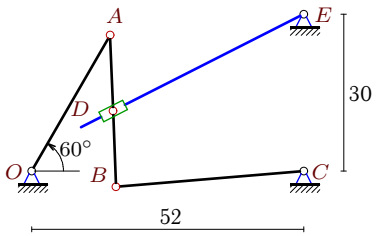
10



$\omega_{OA} = 29\frac{1}{c}$, $\alpha = 45°$, $OA = 35$,
$AB = 44$, $BC = 33$, $BD{=}BC/2$.

Задача К13.20.

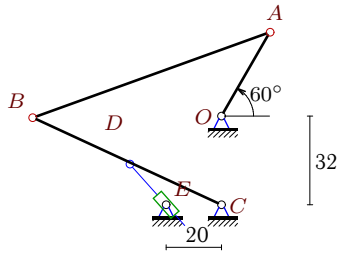
10



$\omega_{OA} = 1\frac{1}{c}$, $\alpha = 60°$, $OA = 30$,
$AB = 29$, $BC = 36$, $AD{=}AB/2$.

Задача К13.21.

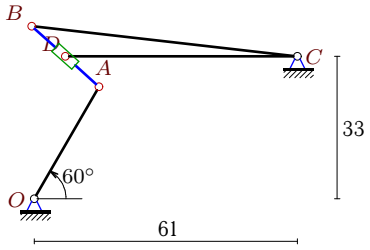
10



$\omega_{OA} = 16\frac{1}{c}$, $\alpha = 60°$, $OA = 35$,
$AB = 91$, $BC = 75$, $BD{=}BC/2$.

Задача К13.22.

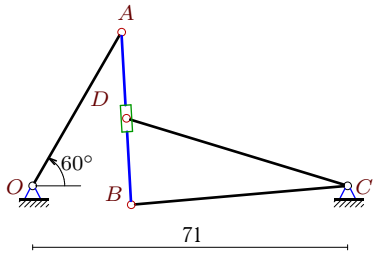
10



$\omega_{OA} = 27\frac{1}{c}$, $\alpha = 60°$, $OA = 30$,
$AB = 21$, $BC = 62$, $AD{=}AB/2$.

Задача К13.23.

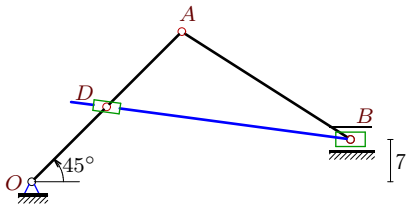
10



$\omega_{OA} = 6\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 39$, $BC = 49$, $AD{=}AB/2$.

Задача К13.24.

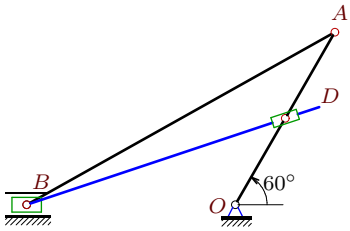
10



$\omega_{OA} = 32\frac{1}{c}$, $\alpha = 45°$, $OA = 35$,
$AB = 33$, $OD{=}OA/2$.

Задача К13.25.

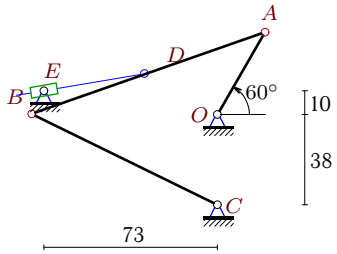
10



$\omega_{OA} = 3\frac{1}{c}$, $\alpha = 60°$, $OA = 35$,
$AB = 62$, $OD{=}OA/2$.

Задача К13.26.

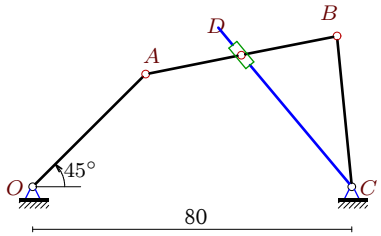
10



$\omega_{OA} = 31\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 104$, $BC = 87$, $AD{=}AB/2$.

Задача К13.27.

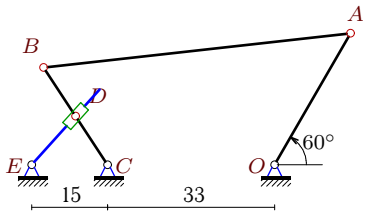
10



$\omega_{OA} = 19\frac{1}{c}$, $\alpha = 45°$, $OA = 40$,
$AB = 49$, $BC = 38$, $AD{=}AB/2$.

Задача К13.28.

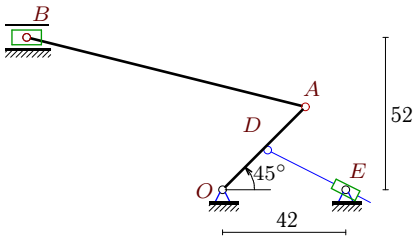
10



$\omega_{OA} = 6\frac{1}{c}$, $\alpha = 60°$, $OA = 30$,
$AB = 61$, $BC = 23$, $BD{=}BC/2$.

Задача К13.29.

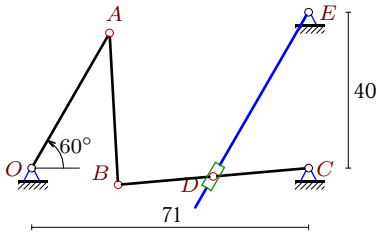
10



$\omega_{OA} = 24\frac{1}{c}$, $\alpha = 45°$, $OA = 40$,
$AB = 98$, $OD{=}OA/2$.

Задача К13.30.

10



$\omega_{OA} = 23\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 39$, $BC = 49$, $BD{=}BC/2$.

К13 **Ответы.**
Механизм с муфтой (1)

07.04.2012

№	v_A	v_B	v_D	v_r	x_B	y_B
1	270	257.5970	171.2705	-102.2681	-50.433	14.084
2	120	190.4150	95.2075	-66.4427	0.408	53.219
3	270	159.6721	135.0000	95.6616	57.772	26.908
4	150	145.2367	75.0000	-73.8830	-48.683	39.000
5	680	596.5229	563.3183	-317.6813	-56.696	27.810
6	1085	608.3864	768.1420	17.4512	65.979	32.754
7	930	836.0118	752.2560	-150.0977	-43.613	19.233
8	70	62.5411	35.0000	-16.1639	-50.108	23.021
9	560	312.3510	390.3320	-10.3616	64.000	32.450
10	150	62.6520	99.6441	93.0192	-30.613	0.000
11	805	1266.8929	402.5000	-1250.7746	0.611	47.363
12	560	1044.5646	705.2786	-1072.0827	58.000	10.537
13	870	491.6480	612.6453	-1103.7824	55.615	27.655
14	1120	4164.2245	2509.5299	-668.7573	-58.000	44.182
15	525	284.5084	363.0948	-912.7908	19.155	-3.649
16	990	776.4179	495.0000	-2345.8693	24.218	-4.613
17	480	371.1523	398.5656	-320.4751	53.477	32.349
18	360	203.7011	249.2947	-33.2233	53.652	27.271
19	1015	576.1548	288.0774	271.7390	67.980	32.938
20	30	16.0125	20.6421	-5.1665	16.125	-2.997
21	560	514.2450	257.1225	102.2276	-68.099	-0.574
22	810	1363.9477	921.5221	368.0946	-0.599	40.040
23	240	131.5419	166.6939	-411.0899	22.189	-4.298
24	1120	1297.2080	560.0000	840.8002	52.569	7.000
25	105	61.5104	52.5000	-23.5388	-36.586	0.000
26	1240	1135.4453	811.4882	808.8166	-78.146	0.240
27	760	424.5991	540.4294	-498.5606	76.347	37.824
28	180	162.5951	81.2976	78.6717	-45.625	19.225
29	960	848.1280	480.0000	-456.2860	-66.803	52.000
30	920	504.2438	252.1219	206.2636	22.189	-4.298

K13 файл o13k10A

№	ω_{AB}	ω_{BC}	ω_e	ε_{AB}	ε_{BC}	ε_e	a_A	a_B	a_D	a_r
1	5.576	10.733	5.996	30.830	107.186	38.574	24.300	37.765	27.566	9.498
2	-6.609	-2.294	-1.063	20.956	18.047	8.185	3.600	15.603	7.801	6.066
3	-5.583	5.914	-1.641	19.218	113.163	1.182	24.300	31.980	12.150	19.671
4	1.178	–	0.341	-10.483	-	-11.106	7.500	1.502	3.750	−0.689
5	7.869	19.243	12.845	46.396	208.016	13.926	115.600	131.660	120.255	23.630
6	-20.406	18.436	-23.557	255.584	1354.487	-636.852	336.350	460.838	390.159	154.458
7	15.755	36.348	-43.532	205.566	787.329	50.629	288.300	353.741	308.359	−37.738
8	1.001	2.316	0.889	0.796	3.134	1.218	1.400	1.678	0.700	0.055
9	-11.535	9.465	-11.535	54.500	385.688	-27.621	89.600	130.666	108.277	−80.022
10	2.047	–	1.572	-8.518	-	-2.936	7.500	4.940	5.767	3.951
11	-50.545	-17.596	23.000	1295.634	1100.760	-4542.261	185.150	823.301	92.575	1602.828
12	20.120	–	20.120	800.829	-	-4672.080	78.400	333.996	134.486	−1029.940
13	-20.120	17.559	-20.120	188.311	1241.446	2510.557	252.300	358.164	299.773	343.627
14	-40.753	–	-40.753	5767.853	-	-3232.304	358.400	5349.001	2804.078	−1169.715
15	12.677	-6.616	12.677	182.071	28.485	-827.824	78.750	22.459	40.601	361.582
16	24.276	-15.845	33.000	1454.405	95.730	294007.458	326.700	131.665	163.350	59801.992
17	-8.144	11.247	6.089	38.381	230.667	104.776	76.800	86.815	80.587	−3.211
18	-9.271	7.275	-9.744	20.498	231.121	-110.069	43.200	66.389	54.077	17.663
19	-17.418	17.459	2.260	254.705	1112.100	60.849	294.350	380.530	190.265	187.626
20	0.851	-0.445	-0.489	0.804	0.131	0.410	0.300	0.085	0.155	−0.199
21	8.726	6.857	-11.193	-9.234	46.112	-150.594	89.600	49.389	24.695	−3.356
22	-60.909	-21.999	-60.909	2025.126	1611.767	2313.989	218.700	1043.372	609.316	453.611
23	5.042	-2.685	5.042	29.460	4.586	-130.051	14.400	4.186	7.408	64.933
24	-28.467	–	-12.624	393.951	-	-305.996	358.400	408.951	179.200	231.917
25	0.971	–	0.414	-4.516	-	-4.207	3.150	2.434	1.575	−1.211
26	16.709	13.051	1.477	-39.706	169.881	617.687	384.400	209.293	272.547	104.506
27	-12.031	11.174	4.837	105.481	492.529	265.059	144.400	193.080	164.743	−37.077
28	2.957	7.069	1.582	7.769	30.609	-16.866	10.800	13.479	6.740	4.531
29	7.139	–	4.769	-184.046	-	-489.832	230.400	70.809	115.200	−42.869
30	19.326	-10.291	-2.977	432.891	67.395	37.863	211.600	61.507	30.754	−2.904