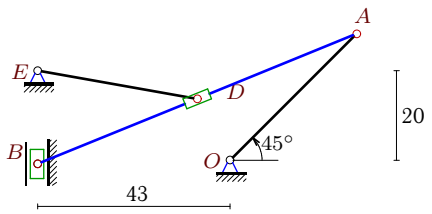
Механизм с муфтой (1)

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).

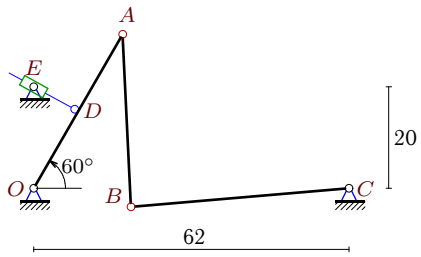
Кирсанов М.Н. **Решебник. Теоретическая механика**/Под ред. А. И. Кириллова.– М.: ФИЗМАТЛИТ, 2008. — 384 с. (с.216.)

Задача К13.1. 2



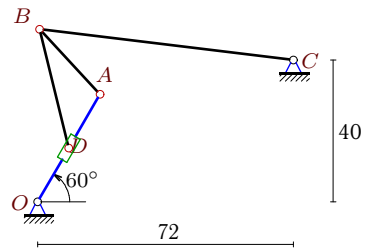
$\omega_{OA} = 25\frac{1}{c}$, $\alpha = 45°$, $OA = 40$, $AB = 77$, AD=$AB/2$.

Задача К13.2. 2



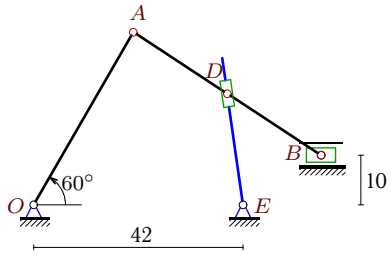
$\omega_{OA} = 15\frac{1}{c}$, $\alpha = 60°$, $OA = 35$, $AB = 34$, $BC = 43$, OD=$OA/2$.

Задача К13.3. 2



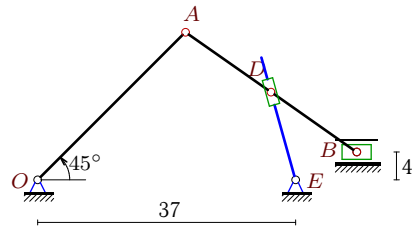
$\omega_{OA} = 20\frac{1}{c}$, $\alpha = 60°$, $OA = 35$, $AB = 25$, $BC = 72$, OD=$OA/2$.

Задача К13.4. 2



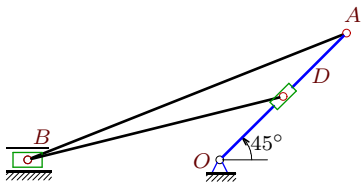
$\omega_{OA} = 1\frac{1}{c}$, $\alpha = 60°$, $OA = 40$, $AB = 45$, AD=$AB/2$.

Задача К13.5. 2



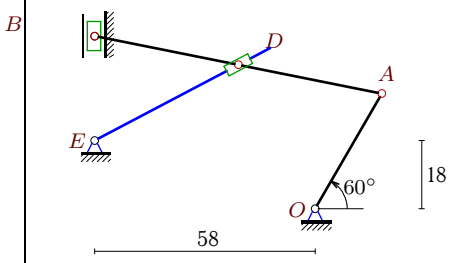
$\omega_{OA} = 9\frac{1}{c}$, $\alpha = 45°$, $OA = 30$, $AB = 30$, AD=$AB/2$.

Задача К13.6. 2



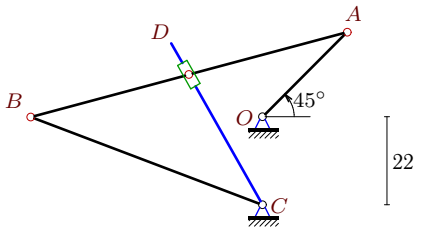
$\omega_{OA} = 18\frac{1}{c}$, $\alpha = 45°$, $OA = 35$, $AB = 67$, OD=$OA/2$.

Задача К13.7.



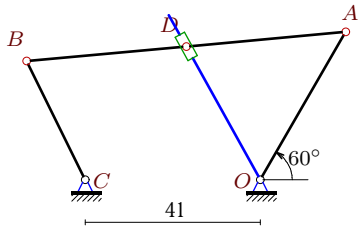
$\omega_{OA} = 33\frac{1}{c}$, $\alpha = 60°$, $OA = 35$,
$AB = 77$, AD=$AB/2$.

Задача К13.8.



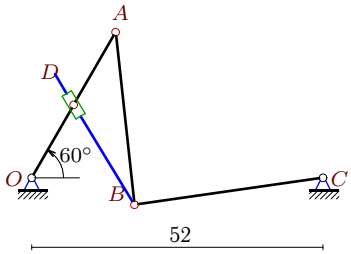
$\omega_{OA} = 16\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 82$, $BC = 62$, AD=$AB/2$.

Задача К13.9.



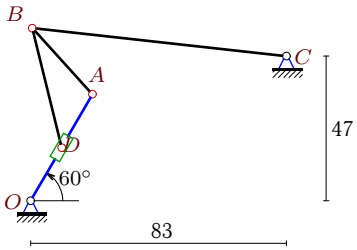
$\omega_{OA} = 20\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 75$, $BC = 31$, AD=$AB/2$.

Задача К13.10.



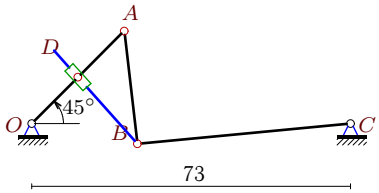
$\omega_{OA} = 26\frac{1}{c}$, $\alpha = 60°$, $OA = 30$,
$AB = 31$, $BC = 34$, OD=$OA/2$.

Задача К13.11.



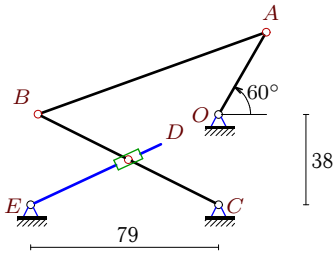
$\omega_{OA} = 2\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 29$, $BC = 83$, OD=$OA/2$.

Задача К13.12.



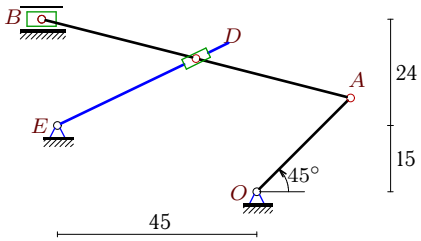
$\omega_{OA} = 32\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 26$, $BC = 49$, OD=$OA/2$.

Задача К13.13.



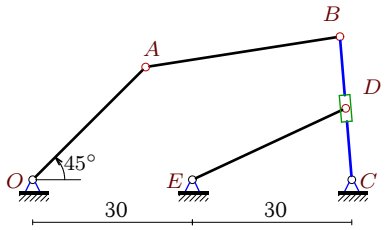
$\omega_{OA} = 33\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 102$, $BC = 85$, BD=$BC/2$.

Задача К13.14.



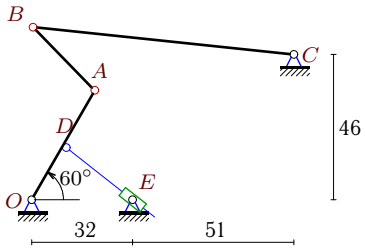
$\omega_{OA} = 23\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 72$, AD=$AB/2$.

Задача К13.15.



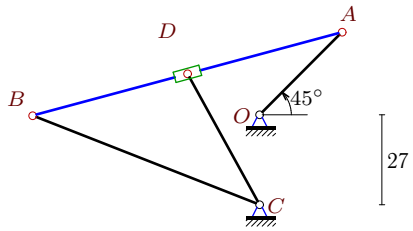
$\omega_{OA} = 27\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 37$, $BC = 27$, $BD{=}BC/2$.

Задача К13.16.



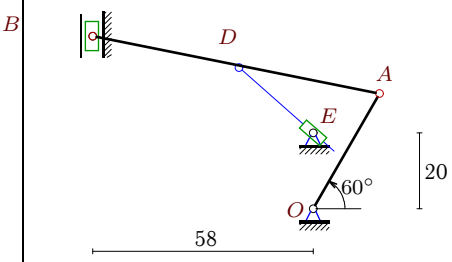
$\omega_{OA} = 23\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 28$, $BC = 83$, $OD{=}OA/2$.

Задача К13.17.



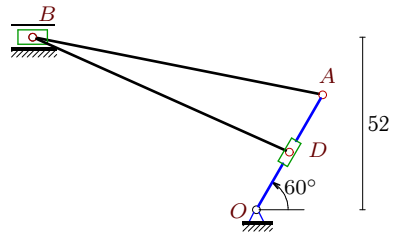
$\omega_{OA} = 28\frac{1}{c}$, $\alpha = 45°$, $OA = 35$,
$AB = 96$, $BC = 73$, $AD{=}AB/2$.

Задача К13.18.



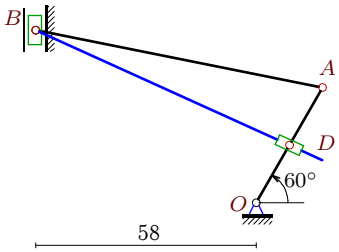
$\omega_{OA} = 2\frac{1}{c}$, $\alpha = 60°$, $OA = 35$,
$AB = 77$, $AD{=}AB/2$.

Задача К13.19.



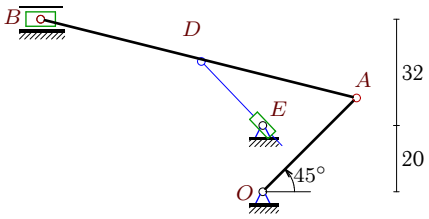
$\omega_{OA} = 31\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 89$, $OD{=}OA/2$.

Задача К13.20.



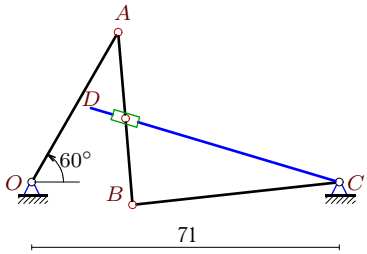
$\omega_{OA} = 12\frac{1}{c}$, $\alpha = 60°$, $OA = 35$,
$AB = 77$, $OD{=}OA/2$.

Задача К13.21.



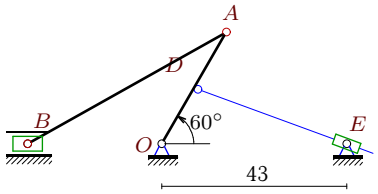
$\omega_{OA} = 15\frac{1}{c}$, $\alpha = 45°$, $OA = 40$,
$AB = 98$, $AD{=}AB/2$.

Задача К13.22.



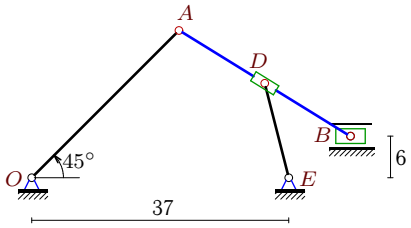
$\omega_{OA} = 3\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 40$, $BC = 48$, $AD{=}AB/2$.

Задача К13.23.



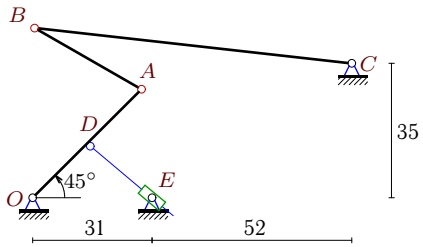
$\omega_{OA} = 7\frac{1}{c}$, $\alpha = 60°$, $OA = 30$,
$AB = 53$, $OD{=}OA/2$.

Задача К13.24.



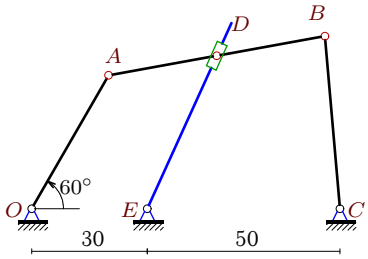
$\omega_{OA} = 12\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 29$, $AD{=}AB/2$.

Задача К13.25.



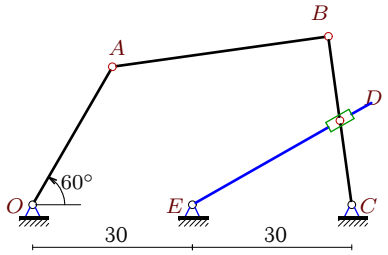
$\omega_{OA} = 22\frac{1}{c}$, $\alpha = 45°$, $OA = 40$,
$AB = 32$, $BC = 83$, $OD{=}OA/2$.

Задача К13.26.



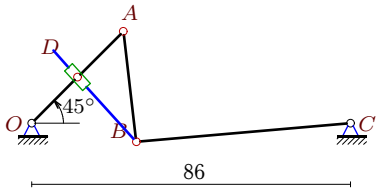
$\omega_{OA} = 6\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 57$, $BC = 45$, $AD{=}AB/2$.

Задача К13.27.



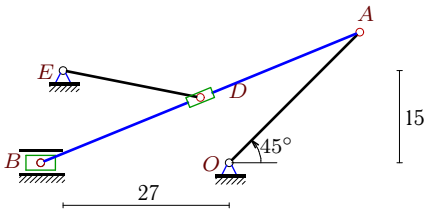
$\omega_{OA} = 2\frac{1}{c}$, $\alpha = 60°$, $OA = 30$,
$AB = 41$, $BC = 32$, $BD{=}BC/2$.

Задача К13.28.



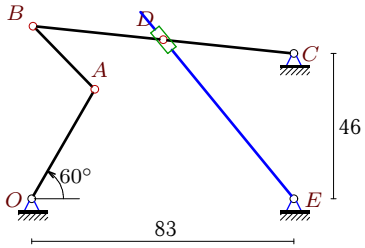
$\omega_{OA} = 1\frac{1}{c}$, $\alpha = 45°$, $OA = 35$,
$AB = 30$, $BC = 58$, $OD{=}OA/2$.

Задача К13.29.



$\omega_{OA} = 28\frac{1}{c}$, $\alpha = 45°$, $OA = 30$,
$AB = 56$, $AD{=}AB/2$.

Задача К13.30.



$\omega_{OA} = 26\frac{1}{c}$, $\alpha = 60°$, $OA = 40$,
$AB = 28$, $BC = 83$, $BD{=}BC/2$.

К13 **Ответы.**
Механизм с муфтой (1) 30.04.2012

№	v_A	v_B	v_D	v_r	x_B	y_B
1	1000	1024.2851	387.4926	378.9946	-43.000	-0.828
2	525	284.5084	262.5000	262.4577	19.155	-3.649
3	700	1033.3252	350.0000	-1003.5139	0.523	48.662
4	40	47.7292	42.3817	-15.6969	57.654	10.000
5	270	324.6701	274.9009	-160.9699	45.784	4.000
6	630	268.4017	315.0000	114.3484	-37.513	0.000
7	1155	5570.7006	3114.5180	-989.4659	-58.000	45.435
8	480	410.3175	243.3622	-99.7937	-57.983	-0.046
9	800	699.9419	661.9767	-360.4091	-54.689	27.814
10	780	460.9082	390.0000	81.7141	18.346	-4.838
11	80	115.0994	40.0000	-111.3914	0.501	56.107
12	960	752.8900	480.0000	126.6979	24.218	-4.613
13	1320	1176.3173	588.1586	460.6810	-75.977	0.111
14	690	612.2901	601.7633	389.5436	-48.555	39.000
15	810	479.0163	239.5082	649.5118	57.772	26.908
16	920	1385.6330	460.0000	-455.2819	0.456	54.692
17	980	819.4088	497.6871	881.0911	-67.932	-0.276
18	70	337.6182	188.7587	-146.0126	-58.000	45.435
19	1240	1197.1672	620.0000	4677.0763	-67.291	52.000
20	420	2025.7093	210.0000	-627.8495	-58.000	45.435
21	600	530.0800	522.2003	-483.0911	-66.803	52.000
22	120	68.3569	84.8130	-71.6329	23.285	-5.224
23	210	122.8121	105.0000	-103.4361	-31.195	0.000
24	360	411.4142	356.4827	-285.8473	45.902	6.000
25	880	2135.6279	440.0000	-438.3213	0.509	44.175
26	240	183.8368	202.2894	33.4742	76.082	44.829
27	60	47.2724	23.6362	21.9485	55.600	31.696
28	35	27.4577	17.5000	4.3646	28.220	-5.050
29	840	350.8515	558.0069	623.9924	-30.613	0.000
30	1040	1566.3677	783.1839	-550.3537	0.456	54.692

K13 файл o13k2A

№	ω_{AB}	ω_{BC}	ω_e	ε_{AB}	ε_{BC}	ε_e	a_A	a_B	a_D	a_r
1	24.289	–	24.289	-837.273	-	1337.475	250.000	591.813	225.558	261.208
2	12.677	-6.616	-0.471	182.071	28.485	368.903	78.750	22.459	39.375	0.684
3	-39.808	-14.352	20.000	611.157	696.686	-2944.736	140.000	523.077	70.000	1035.198
4	-0.531	–	1.746	0.735	-	-1.610	0.400	0.125	0.238	−0.539
5	-7.770	–	17.032	27.634	-	-237.866	24.300	27.261	23.825	−35.624
6	7.155	–	18.000	-108.440	-	-219.077	113.400	75.150	56.700	58.111
7	-66.135	–	69.223	20573.817	-	-20586.999	381.150	16524.840	8428.002	1965.833
8	9.131	6.618	5.933	6.754	55.730	79.443	76.800	43.946	52.331	18.629
9	9.494	22.579	15.545	64.026	280.780	11.056	160.000	180.423	165.401	31.594
10	19.790	-13.556	17.648	592.732	130.697	756.144	202.800	76.672	101.400	−81.732
11	-3.816	-1.387	2.000	4.822	6.396	-27.870	1.600	5.543	0.800	11.103
12	23.540	-15.365	23.194	1367.594	90.016	1366.763	307.200	123.806	153.600	−205.443
13	17.832	13.839	-8.086	-47.672	195.715	-420.071	435.600	232.757	116.379	−15.018
14	6.993	–	13.187	-173.311	-	249.666	158.700	47.271	97.506	35.714
15	-16.748	17.741	17.741	172.966	1018.465	2057.668	218.700	287.818	143.909	605.656
16	-46.973	-16.694	-2.347	881.992	937.458	-297.659	211.600	811.748	105.800	13.572
17	15.704	11.225	15.704	19.910	172.371	-1562.364	274.400	155.862	188.916	807.931
18	-4.008	–	4.429	75.570	-	-134.669	1.400	60.697	30.957	14.923
19	7.103	–	31.000	-391.402	-	-57396.911	384.400	80.220	192.200	48421.115
20	-24.049	–	-24.889	2720.505	-	3107.060	50.400	2185.103	25.200	451.110
21	4.462	–	-7.115	-71.893	-	49.376	90.000	27.660	55.645	−22.658
22	2.420	-1.424	-0.882	7.601	1.339	6.060	3.600	1.166	1.865	−0.244
23	2.273	–	0.478	-24.653	-	-21.767	14.700	11.368	7.350	−1.350
24	-10.311	–	-10.311	58.221	-	876.905	43.200	47.936	42.109	55.981
25	-54.015	-25.730	1.745	1463.688	1147.180	-507.759	193.600	1099.347	96.800	−9.118
26	-2.425	4.085	4.572	8.098	26.717	16.391	14.400	14.176	14.001	4.269
27	-0.899	1.477	0.274	0.608	3.341	-0.017	1.200	1.277	0.638	0.602
28	0.750	-0.473	0.742	1.344	0.077	1.341	0.350	0.137	0.175	−0.235
29	11.461	–	11.461	-267.138	-	291.597	235.200	154.907	180.860	108.090
30	-53.099	-18.872	-8.559	1127.082	1197.961	528.508	270.400	1037.319	518.659	406.820