

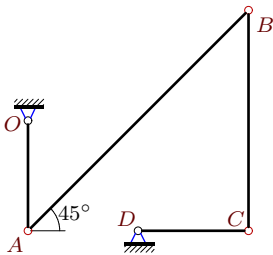
Уравнение трех угловых ускорений. Две степени свободы

В указанном положении механизма заданы угловые скорости и ускорения двух звеньев. Длины звеньев даны в сантиметрах. Звенья, направление которых не указано, принимать вертикальными или горизонтальными. Найти угловые ускорения звеньев механизма.

Кирсанов М.Н. **Решебник. Теоретическая механика**/Под ред. А. И. Кириллова.– М.: ФИЗМАТЛИТ, 2008. – 384 с. (с.183.)

Задача К20.1.

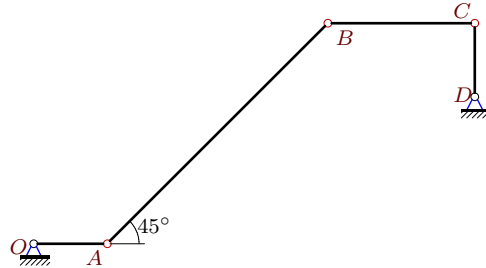
4



$$\begin{aligned} \omega_{OAz} &= 4 \text{ рад/с}, \quad \omega_{CDz} = 0, \\ \varepsilon_{OAz} &= 0, \quad \varepsilon_{BCz} = -8 \text{ рад/с}^2, \\ OA &= 1, \quad AB = 2\sqrt{2}, \quad BC = 2, \quad CD = 1. \end{aligned}$$

Задача К20.2.

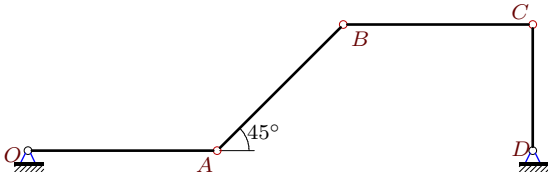
4



$$\begin{aligned} \omega_{OAz} &= 6 \text{ рад/с}, \quad \omega_{BCz} = -3 \text{ рад/с}, \\ \varepsilon_{OAz} &= 18 \text{ рад/с}^2, \quad \varepsilon_{BCz} = 15 \text{ рад/с}^2, \\ OA &= 1, \quad AB = 3\sqrt{2}, \quad BC = 2, \quad CD = 1. \end{aligned}$$

Задача К20.3.

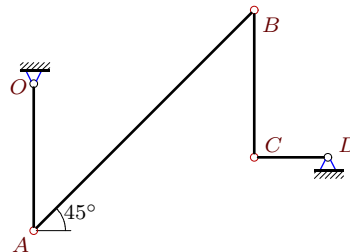
4



$$\begin{aligned} \omega_{OAz} &= 6 \text{ рад/с}, \quad \omega_{CDz} = 0, \\ \varepsilon_{BCz} &= 52 \text{ рад/с}^2, \quad \varepsilon_{CDz} = 12 \text{ рад/с}^2, \\ OA &= 3, \quad AB = 2\sqrt{2}, \quad BC = 3, \quad CD = 2. \end{aligned}$$

Задача К20.4.

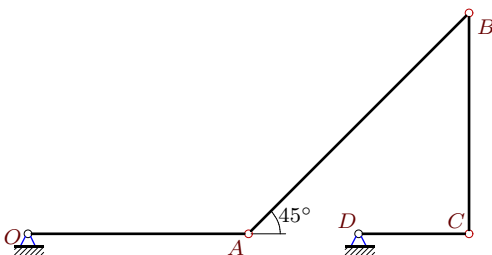
4



$$\begin{aligned} \omega_{OAz} &= 6 \text{ рад/с}, \quad \omega_{BCz} = -6 \text{ рад/с}, \\ \varepsilon_{BCz} &= -75 \text{ рад/с}^2, \quad \varepsilon_{CDz} = -6 \text{ рад/с}^2, \\ OA &= 2, \quad AB = 3\sqrt{2}, \quad BC = 2, \quad CD = 1. \end{aligned}$$

Задача К20.5.

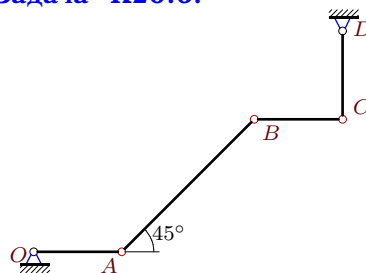
4



$$\begin{aligned} \omega_{OAz} &= 4 \text{ рад/с}, \quad \omega_{BCz} = -2 \text{ рад/с}, \\ \varepsilon_{BCz} &= 6 \text{ рад/с}^2, \quad \varepsilon_{CDz} = -4 \text{ рад/с}^2, \\ OA &= 2, \quad AB = 2\sqrt{2}, \quad BC = 2, \quad CD = 1. \end{aligned}$$

Задача К20.6.

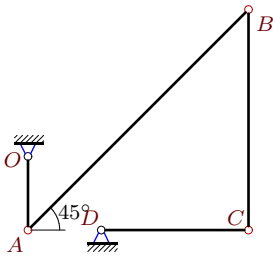
4



$$\begin{aligned} \omega_{OAz} &= 6 \text{ рад/с}, \quad \omega_{CDz} = 0, \\ \varepsilon_{BCz} &= 72 \text{ рад/с}^2, \quad \varepsilon_{CDz} = 6 \text{ рад/с}^2, \\ OA &= 2, \quad AB = 3\sqrt{2}, \quad BC = CD = 2. \end{aligned}$$

Задача K20.7.

4



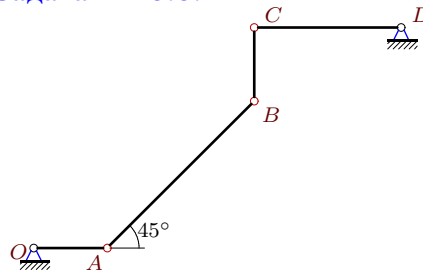
$$\omega_{OAz} = 9 \text{ рад/с}, \omega_{BCz} = -3 \text{ рад/с},$$

$$\varepsilon_{OAz} = 27 \text{ рад/с}^2, \varepsilon_{BCz} = -39 \text{ рад/с}^2,$$

$$OA = 1, AB = 3\sqrt{2}, BC = 3, CD = 2.$$

Задача K20.8.

4



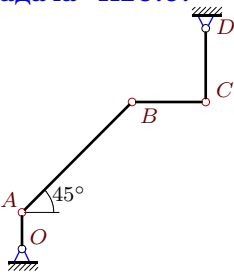
$$\omega_{OAz} = -2 \text{ рад/с}, \omega_{CDz} = 4 \text{ рад/с},$$

$$\varepsilon_{OAz} = 0, \varepsilon_{BCz} = -116 \text{ рад/с}^2,$$

$$OA = 1, AB = 2\sqrt{2}, BC = 1, CD = 2.$$

Задача K20.9.

4



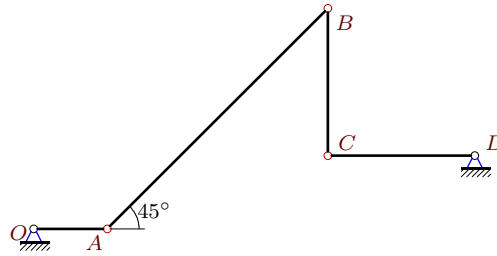
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = -6 \text{ рад/с}^2, \varepsilon_{BCz} = 30 \text{ рад/с}^2,$$

$$OA = 1, AB = 3\sqrt{2}, BC = CD = 2.$$

Задача K20.10.

4



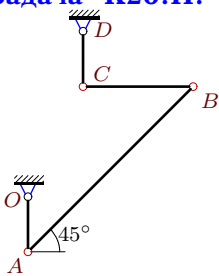
$$\omega_{BCz} = -3 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = 0, \varepsilon_{CDz} = -6 \text{ рад/с}^2,$$

$$OA = 1, AB = 3\sqrt{2}, BC = CD = 2.$$

Задача K20.11.

4



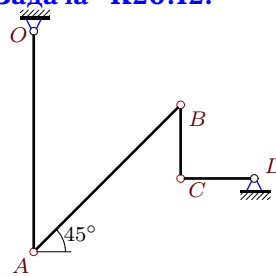
$$\omega_{OAz} = -6 \text{ рад/с}, \omega_{BCz} = 0,$$

$$\varepsilon_{OAz} = 0, \varepsilon_{BCz} = 3 \text{ рад/с}^2,$$

$$OA = 1, AB = 3\sqrt{2}, BC = 2, CD = 1.$$

Задача K20.12.

4



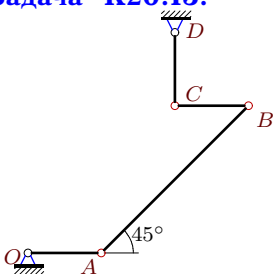
$$\omega_{OAz} = 2 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = 4 \text{ рад/с}^2, \varepsilon_{CDz} = -2 \text{ рад/с}^2,$$

$$OA = 3, AB = 2\sqrt{2}, BC = CD = 1.$$

Задача K20.13.

4



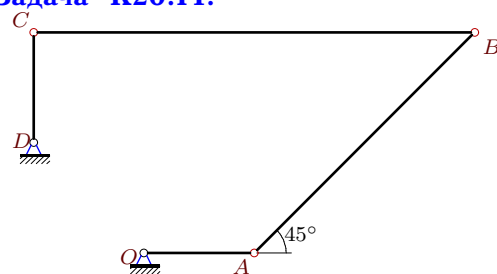
$$\omega_{OAz} = -2 \text{ рад/с}, \omega_{CDz} = 2 \text{ рад/с},$$

$$\varepsilon_{BCz} = 8 \text{ рад/с}^2, \varepsilon_{CDz} = -4 \text{ рад/с}^2,$$

$$OA = 1, AB = 2\sqrt{2}, BC = CD = 1.$$

Задача K20.14.

4



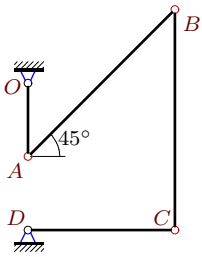
$$\omega_{BCz} = -2 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{BCz} = -14 \text{ рад/с}^2, \varepsilon_{CDz} = 8 \text{ рад/с}^2,$$

$$OA = 1, AB = 2\sqrt{2}, BC = 4, CD = 1.$$

Задача K20.15.

4



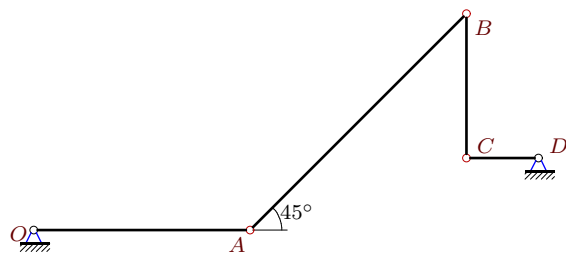
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{BCz} = -2 \text{ рад/с},$$

$$\varepsilon_{OAz} = 18 \text{ рад/с}^2, \varepsilon_{CDz} = 6 \text{ рад/с}^2,$$

$$OA = 1, AB = 2\sqrt{2}, BC = 3, CD = 2.$$

Задача K20.16.

4



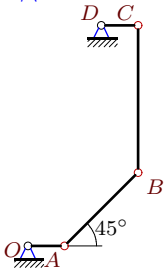
$$\omega_{BCz} = -9 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = 12 \text{ рад/с}^2, \varepsilon_{BCz} = 60 \text{ рад/с}^2,$$

$$OA = 3, AB = 3\sqrt{2}, BC = 2, CD = 1.$$

Задача K20.17.

4



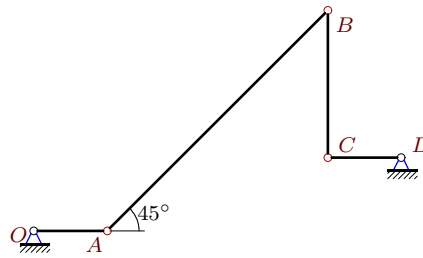
$$\omega_{OAz} = -8 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{BCz} = -38 \text{ рад/с}^2, \varepsilon_{CDz} = -8 \text{ рад/с}^2,$$

$$OA = 1, AB = 2\sqrt{2}, BC = 4, CD = 1.$$

Задача K20.18.

4



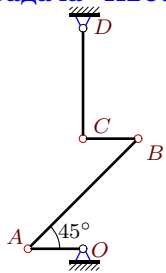
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{BCz} = 15 \text{ рад/с}^2, \varepsilon_{CDz} = 12 \text{ рад/с}^2,$$

$$OA = 1, AB = 3\sqrt{2}, BC = 2, CD = 1.$$

Задача K20.19.

4



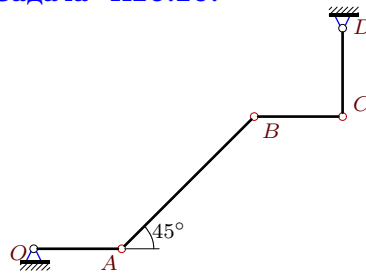
$$\omega_{BCz} = 2 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = 2 \text{ рад/с}^2, \varepsilon_{CDz} = -4 \text{ рад/с}^2,$$

$$OA = 1, AB = 2\sqrt{2}, BC = 1, CD = 2.$$

Задача K20.20.

4



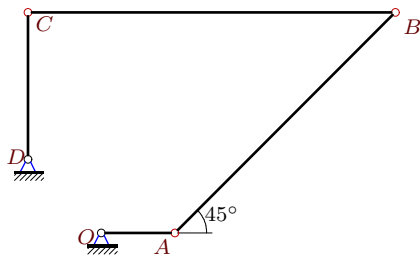
$$\omega_{BCz} = -18 \text{ рад/с}, \omega_{CDz} = -12 \text{ рад/с},$$

$$\varepsilon_{OAz} = 6 \text{ рад/с}^2, \varepsilon_{CDz} = 0,$$

$$OA = 2, AB = 3\sqrt{2}, BC = CD = 2.$$

Задача K20.21.

4



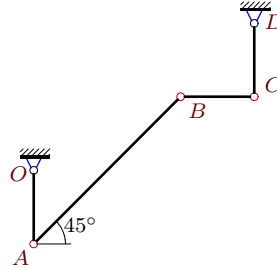
$$\omega_{OAz} = -15 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = -30 \text{ рад/с}^2, \varepsilon_{CDz} = -15 \text{ рад/с}^2,$$

$$OA = 1, AB = 3\sqrt{2}, BC = 5, CD = 2.$$

Задача K20.22.

4



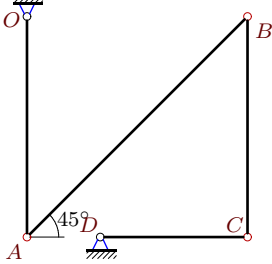
$$\omega_{OAz} = \omega_{CDz} = 2 \text{ рад/с},$$

$$\varepsilon_{OAz} = 0, \varepsilon_{BCz} = 2 \text{ рад/с}^2,$$

$$OA = 1, AB = 2\sqrt{2}, BC = CD = 1.$$

Задача K20.23.

4



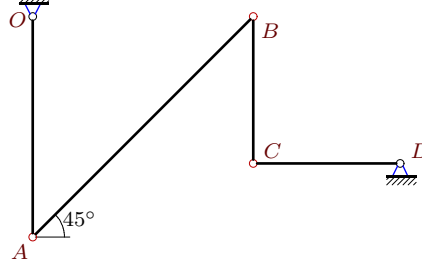
$$\omega_{OAz} = 9 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = 18 \text{ рад/с}^2, \varepsilon_{BCz} = -168 \text{ рад/с}^2,$$

$$OA = 3, AB = 3\sqrt{2}, BC = 3, CD = 2.$$

Задача K20.24.

4



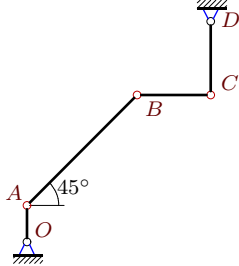
$$\omega_{BCz} = -9 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = 12 \text{ рад/с}^2, \varepsilon_{CDz} = 6 \text{ рад/с}^2,$$

$$OA = 3, AB = 3\sqrt{2}, BC = CD = 2.$$

Задача K20.25.

4



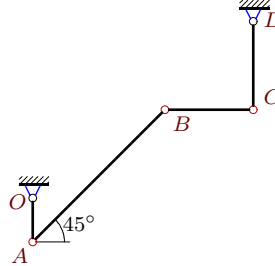
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{BCz} = 3 \text{ рад/с},$$

$$\varepsilon_{BCz} = 42 \text{ рад/с}^2, \varepsilon_{CDz} = 6 \text{ рад/с}^2,$$

$$OA = 1, AB = 3\sqrt{2}, BC = CD = 2.$$

Задача K20.26.

4



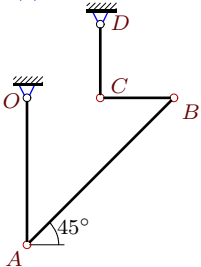
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{BCz} = -3 \text{ рад/с},$$

$$\varepsilon_{BCz} = -3 \text{ рад/с}^2, \varepsilon_{CDz} = -6 \text{ рад/с}^2,$$

$$OA = 1, AB = 3\sqrt{2}, BC = CD = 2.$$

Задача K20.27.

4



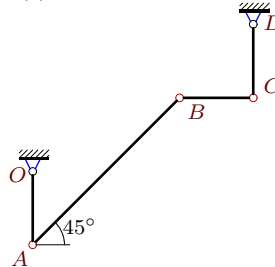
$$\omega_{BCz} = -4 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{BCz} = \varepsilon_{CDz} = 2 \text{ рад/с}^2,$$

$$OA = 2, AB = 2\sqrt{2}, BC = CD = 1.$$

Задача K20.28.

4



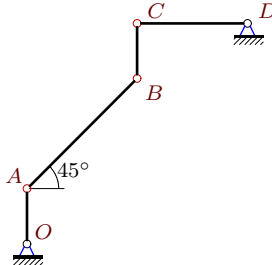
$$\omega_{OAz} = 2 \text{ рад/с}, \omega_{BCz} = -4 \text{ рад/с},$$

$$\varepsilon_{OAz} = 0, \varepsilon_{CDz} = 4 \text{ рад/с}^2,$$

$$OA = 1, AB = 2\sqrt{2}, BC = CD = 1.$$

Задача K20.29.

4



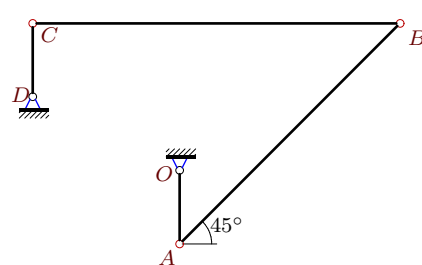
$$\omega_{OAz} = -2 \text{ рад/с}, \omega_{BCz} = 2 \text{ рад/с},$$

$$\varepsilon_{OAz} = 2 \text{ рад/с}^2, \varepsilon_{CDz} = -2 \text{ рад/с}^2,$$

$$OA = 1, AB = 2\sqrt{2}, BC = 1, CD = 2.$$

Задача K20.30.

4



$$\omega_{OAz} = -15 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = \varepsilon_{CDz} = -15 \text{ рад/с}^2,$$

$$OA = 1, AB = 3\sqrt{2}, BC = 5, CD = 1.$$

К20 Ответы.**Уравнение трех угловых ускорений. Две степени свободы**

13.04.2012

№	ω_{OAz}	ω_{ABz}	ω_{BCz}	ω_{CDz}	ε_{OA}	ε_{AB}	ε_{BC}	ε_{CD}
1	—	0	-2	—	—	-8	—	8
2	—	0	—	0	—	-16	—	6
3	—	0	-6	—	12	-96	—	—
4	—	0	—	0	6	-46	—	—
5	—	-2	—	4	4	-6	—	—
6	—	0	-6	—	6	-52	—	—
7	—	0	—	0	—	-30	—	9
8	—	-3	6	—	—	31	—	-4
9	—	-2	3	—	—	-4	—	-6
10	6	-2	—	—	—	2	27	—
11	—	0	—	-6	—	2	—	-6
12	—	0	-6	—	—	-23	-58	—
13	—	-1	-4	—	0	7	—	—
14	-8	0	—	—	-16	-20	—	—
15	—	0	—	0	—	-18	-18	—
16	6	-6	—	—	—	-32	—	6
17	—	4	-2	—	-16	28	—	—
18	—	-2	-3	—	0	-6	—	—
19	-2	0	—	—	—	8	14	—
20	6	8	—	—	—	-304	690	—
21	—	0	-3	—	—	-70	-48	—
22	—	0	0	—	—	-1	—	2
23	—	0	-9	—	—	-150	—	18
24	6	0	—	—	—	-94	-159	—
25	—	-2	—	0	-6	-12	—	—
26	—	2	—	0	0	-6	—	—
27	-2	-2	—	—	-2	1	—	—
28	—	2	—	-2	—	-14	36	—
29	—	0	—	0	—	6	-14	—
30	—	-5	-3	—	—	-20	18	—

К20 файл о20к4А