

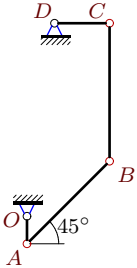
Уравнение трех угловых ускорений. Две степени свободы

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 K20.1.

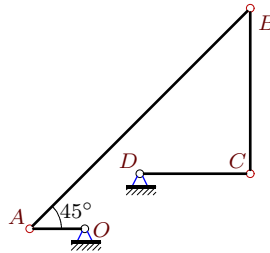
2



$$\begin{aligned} \omega_{BCz} &= -3 \text{ рад/с}, \quad \omega_{CDz} = 0, \\ \varepsilon_{OAz} &= -30 \text{ рад/с}^2, \quad \varepsilon_{CDz} = -15 \text{ рад/с}^2, \\ OA &= 1, \quad AB = 3\sqrt{2}, \quad BC = 5, \quad CD = 2. \end{aligned}$$

Задача K20.2.

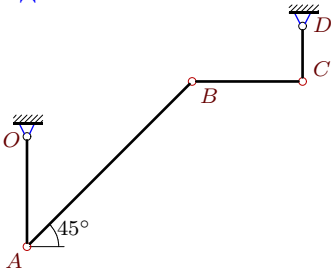
2



$$\begin{aligned} \omega_{OAz} &= 12 \text{ рад/с}, \quad \omega_{BCz} = 20 \text{ рад/с}, \\ \varepsilon_{BCz} &= -220 \text{ рад/с}^2, \quad \varepsilon_{CDz} = 24 \text{ рад/с}^2, \\ OA &= 1, \quad AB = 4\sqrt{2}, \quad BC = 3, \quad CD = 2. \end{aligned}$$

Задача K20.3.

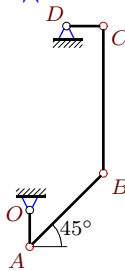
2



$$\begin{aligned} \omega_{OAz} &= 6 \text{ рад/с}, \quad \omega_{CDz} = -6 \text{ рад/с}, \\ \varepsilon_{OAz} &= 6 \text{ рад/с}^2, \quad \varepsilon_{BCz} = 171 \text{ рад/с}^2, \\ OA &= 2, \quad AB = 3\sqrt{2}, \quad BC = 2, \quad CD = 1. \end{aligned}$$

Задача K20.4.

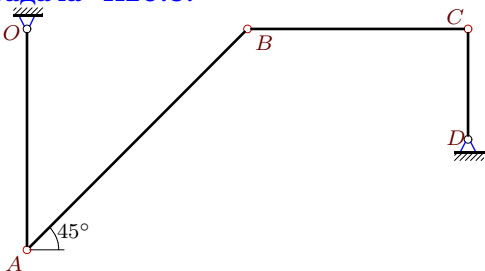
2



$$\begin{aligned} \omega_{OAz} &= -8 \text{ рад/с}, \quad \omega_{CDz} = 0, \\ \varepsilon_{OAz} &= -16 \text{ рад/с}^2, \quad \varepsilon_{CDz} = -8 \text{ рад/с}^2, \\ OA &= 1, \quad AB = 2\sqrt{2}, \quad BC = 4, \quad CD = 1. \end{aligned}$$

Задача K20.5.

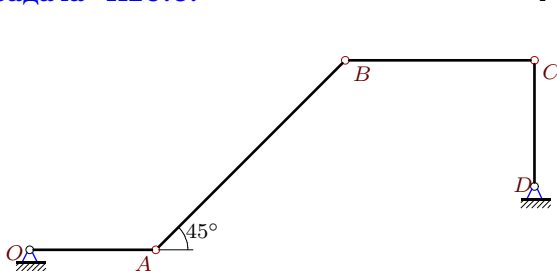
2



$$\begin{aligned} \omega_{OAz} &= 4 \text{ рад/с}, \quad \omega_{BCz} = -4 \text{ рад/с}, \\ \varepsilon_{BCz} &= 26 \text{ рад/с}^2, \quad \varepsilon_{CDz} = 4 \text{ рад/с}^2, \\ OA &= 2, \quad AB = 2\sqrt{2}, \quad BC = 2, \quad CD = 1. \end{aligned}$$

Задача K20.6.

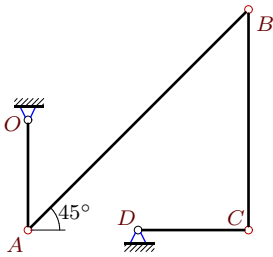
2



$$\begin{aligned} \omega_{OAz} &= 9 \text{ рад/с}, \quad \omega_{CDz} = 0, \\ \varepsilon_{OAz} &= \varepsilon_{CDz} = 9 \text{ рад/с}^2, \\ OA &= 2, \quad AB = 3\sqrt{2}, \quad BC = 3, \quad CD = 2. \end{aligned}$$

Задача K20.7.

2



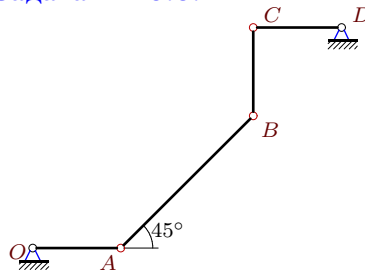
$$\omega_{OAz} = 4 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{BCz} = -16 \text{ рад/с}^2, \varepsilon_{CDz} = 4 \text{ рад/с}^2,$$

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

Задача K20.8.

2



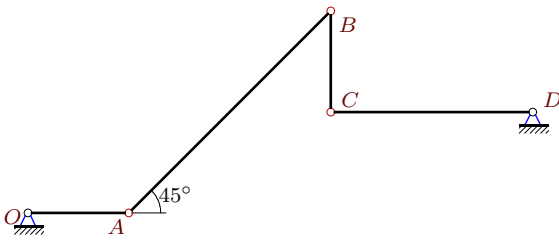
$$\omega_{OAz} = -6 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{BCz} = -120 \text{ рад/с}^2, \varepsilon_{CDz} = 6 \text{ рад/с}^2,$$

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

Задача K20.9.

2



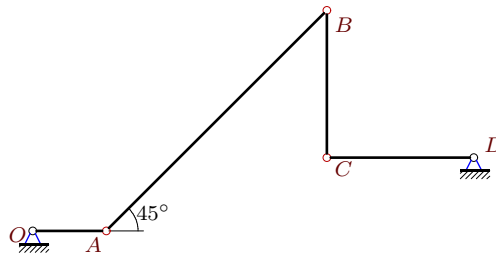
$$\omega_{OAz} = 2 \text{ рад/с}, \omega_{BCz} = -10 \text{ рад/с},$$

$$\varepsilon_{BCz} = 30 \text{ рад/с}^2, \varepsilon_{CDz} = 0,$$

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

Задача K20.10.

2



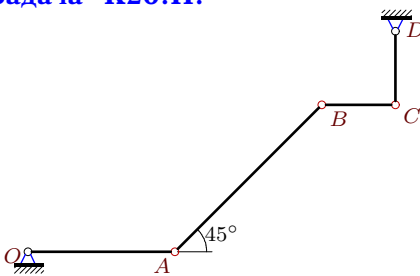
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{CDz} = 12 \text{ рад/с},$$

$$\varepsilon_{OAz} = 18 \text{ рад/с}^2, \varepsilon_{CDz} = 0,$$

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

Задача K20.11.

2



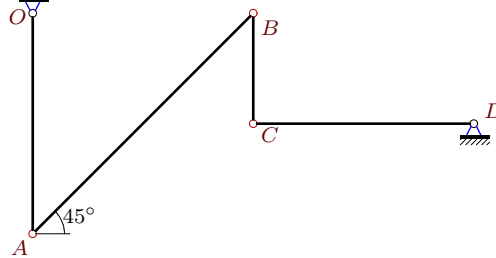
$$\omega_{OAz} = 2 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

Задача K20.12.

2



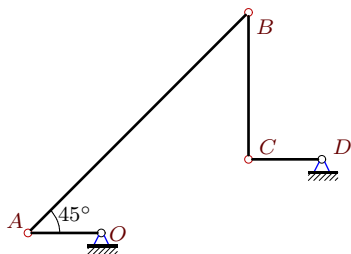
$$\omega_{OAz} = 2 \text{ рад/с}, \omega_{BCz} = -4 \text{ рад/с},$$

$$\varepsilon_{OAz} = 2 \text{ рад/с}^2, \varepsilon_{BCz} = -32 \text{ рад/с}^2,$$

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

Задача K20.13.

2



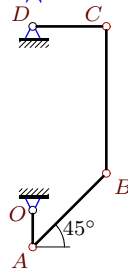
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{BCz} = 3 \text{ рад/с},$$

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

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

Задача K20.14.

2



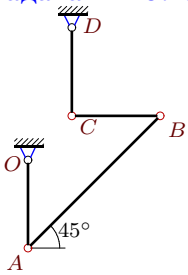
$$\omega_{BCz} = -2 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

Задача K20.15.

2



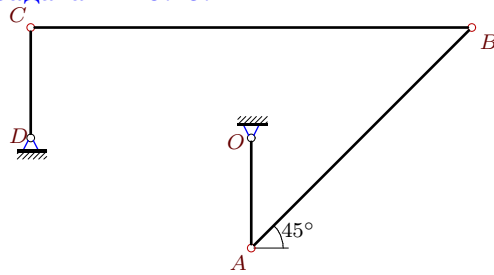
$$\omega_{BCz} = -18 \text{ рад/с}, \omega_{CDz} = 12 \text{ рад/с},$$

$$\varepsilon_{BCz} = -210 \text{ рад/с}^2, \varepsilon_{CDz} = -12 \text{ рад/с}^2,$$

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

Задача K20.16.

2



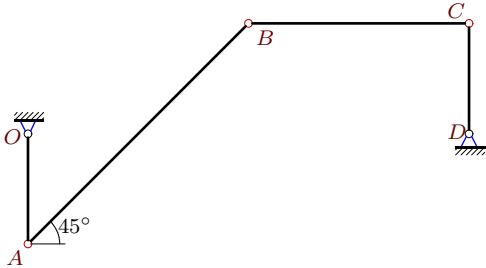
$$\omega_{OAz} = \omega_{CDz} = -8 \text{ рад/с},$$

$$\varepsilon_{OAz} = -8 \text{ рад/с}^2, \varepsilon_{BCz} = -20 \text{ рад/с}^2,$$

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

Задача K20.17.

2



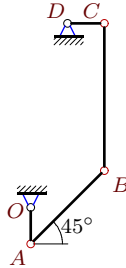
$$\omega_{BCz} = 0, \omega_{CDz} = -4 \text{ рад/с},$$

$$\varepsilon_{OAz} = 12 \text{ рад/с}^2, \varepsilon_{BCz} = -22 \text{ рад/с}^2,$$

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

Задача K20.18.

2



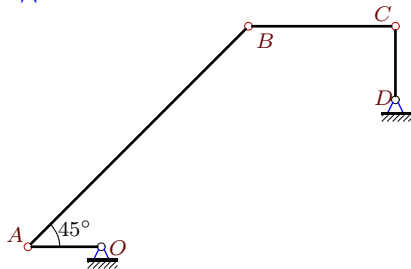
$$\omega_{OAz} = -8 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{BCz} = 16 \text{ рад/с}^2, \varepsilon_{CDz} = -8 \text{ рад/с}^2,$$

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

Задача K20.19.

2



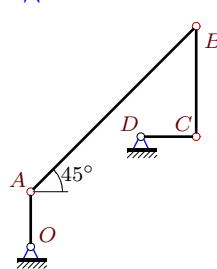
$$\omega_{BCz} = 6 \text{ рад/с}, \omega_{CDz} = -6 \text{ рад/с},$$

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

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

Задача K20.20.

2



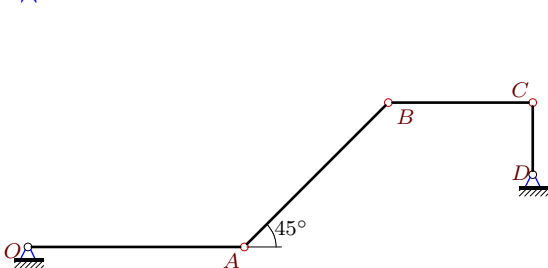
$$\omega_{BCz} = 3 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

Задача K20.21.

2



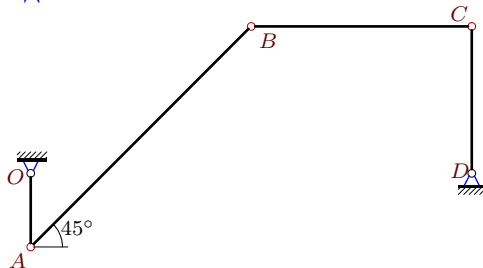
$$\omega_{BCz} = \omega_{CDz} = -4 \text{ рад/с},$$

$$\varepsilon_{BCz} = 26 \text{ рад/с}^2, \varepsilon_{CDz} = 4 \text{ рад/с}^2,$$

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

Задача K20.22.

2



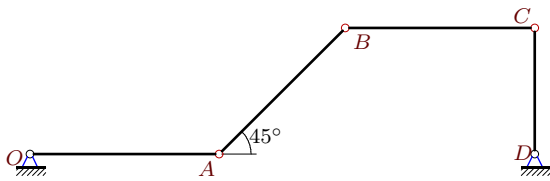
$$\omega_{OAz} = 9 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = 0, \varepsilon_{BCz} = -12 \text{ рад/с}^2,$$

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

Задача K20.23.

2



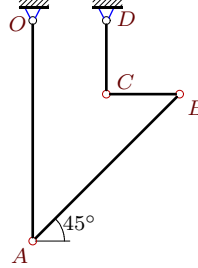
$$\omega_{BCz} = -14 \text{ рад/с}, \omega_{CDz} = 12 \text{ рад/с},$$

$$\varepsilon_{OAz} = 12 \text{ рад/с}^2, \varepsilon_{BCz} = 320 \text{ рад/с}^2,$$

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

Задача K20.24.

2



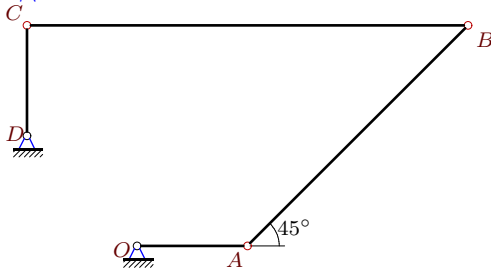
$$\omega_{OAz} = -2 \text{ рад/с}, \omega_{BCz} = -8 \text{ рад/с},$$

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

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

Задача K20.25.

2



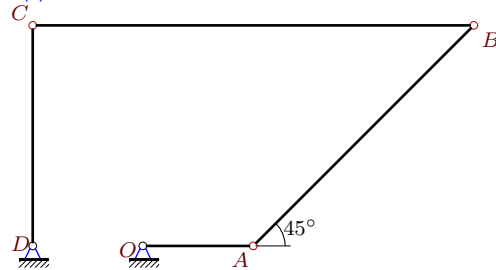
$$\omega_{BCz} = 0, \omega_{CDz} = 8 \text{ рад/с},$$

$$\varepsilon_{OAz} = 0, \varepsilon_{BCz} = -20 \text{ рад/с}^2,$$

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

Задача K20.26.

2



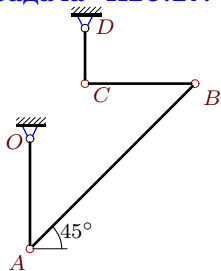
$$\omega_{OAz} = -8 \text{ рад/с}, \omega_{BCz} = -10 \text{ рад/с},$$

$$\varepsilon_{OAz} = -8 \text{ рад/с}^2, \varepsilon_{CDz} = -16 \text{ рад/с}^2,$$

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

Задача K20.27.

2



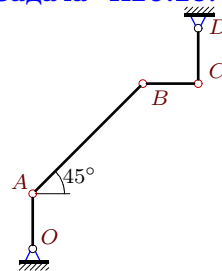
$$\omega_{OAz} = -6 \text{ рад/с}, \omega_{CDz} = 6 \text{ рад/с},$$

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

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

Задача K20.28.

2



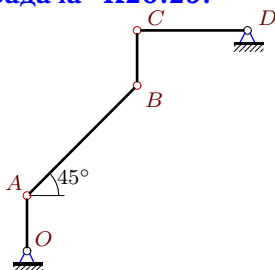
$$\omega_{OAz} = \omega_{CDz} = 2 \text{ рад/с},$$

$$\varepsilon_{BCz} = 42 \text{ рад/с}^2, \varepsilon_{CDz} = 4 \text{ рад/с}^2,$$

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

Задача K20.29.

2



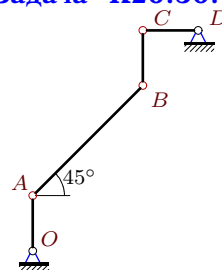
$$\omega_{OAz} = -2 \text{ рад/с}, \omega_{BCz} = 10 \text{ рад/с},$$

$$\varepsilon_{BCz} = -206 \text{ рад/с}^2, \varepsilon_{CDz} = -2 \text{ рад/с}^2,$$

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

Задача K20.30.

2



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

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

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

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	-15	0	—	—	—	-70	36	—
2	—	15	—	24	-12	-66	—	—
3	—	6	-9	—	—	-90	—	12
4	—	0	-2	—	—	-28	10	—
5	—	4	—	0	4	-26	—	—
6	—	0	-6	—	—	-84	78	—
7	—	0	-2	—	12	-10	—	—
8	—	4	-6	—	-6	40	—	—
9	—	-5	—	4	6	-28	—	—
10	—	-10	-15	—	—	-56	228	—
11	—	0	-4	—	—	-14	24	—
12	—	0	—	0	—	-14	—	2
13	—	2	—	0	—	-8	-24	—
14	-8	0	—	—	—	-32	—	-8
15	-6	-12	—	—	-6	76	—	—
16	—	-8	-4	—	—	-40	—	-8
17	4	0	—	—	—	6	—	0
18	—	0	-2	—	8	-28	—	—
19	6	-2	—	—	—	-12	3	—
20	6	0	—	—	—	8	9	—
21	4	-2	—	—	8	-42	—	—
22	—	3	-3	—	—	-6	—	18
23	6	12	—	—	—	-498	—	-6
24	—	-4	—	2	-4	9	—	—
25	-8	4	—	—	—	-56	—	-16
26	—	-16	—	-16	—	-104	-54	—
27	—	-6	-9	—	—	16	-12	—
28	—	-2	4	—	-2	-13	—	—
29	—	-4	—	4	2	70	—	—
30	—	0	—	0	—	6	-14	—

К20 файл о20к2А