

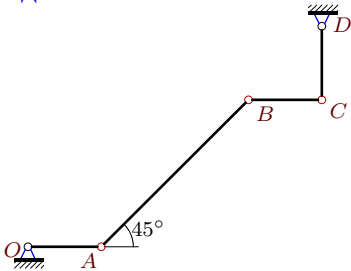
Уравнение трех угловых ускорений. Две степени свободы

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.

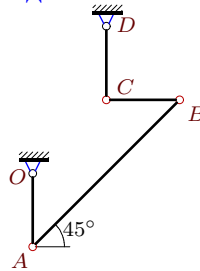
3



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

Задача K20.2.

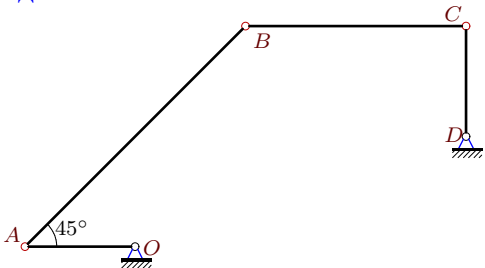
3



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

Задача K20.3.

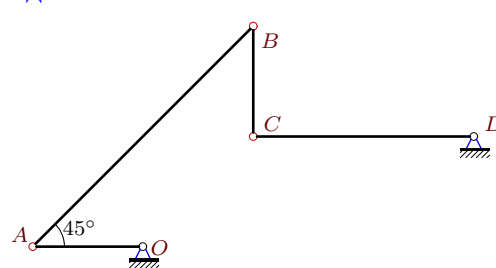
3



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

Задача K20.4.

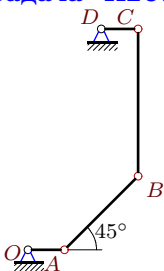
3



$$\begin{aligned} \omega_{BCz} &= 2 \text{ рад/с}, \quad \omega_{CDz} = 0, \\ \varepsilon_{OAz} &= -2 \text{ рад/с}^2, \quad \varepsilon_{BCz} = -10 \text{ рад/с}^2, \\ OA &= 1, \quad AB = 2\sqrt{2}, \quad BC = 1, \quad CD = 2. \end{aligned}$$

Задача K20.5.

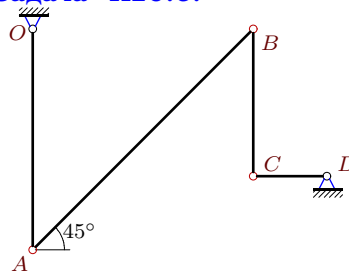
3



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

Задача K20.6.

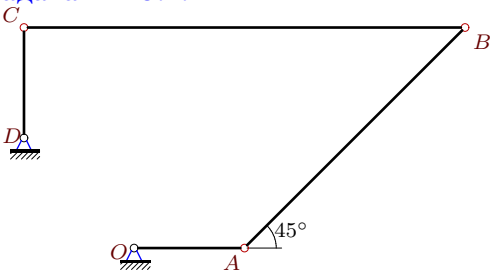
3



$$\begin{aligned} \omega_{BCz} &= -9 \text{ рад/с}, \quad \omega_{CDz} = 0, \\ \varepsilon_{OAz} &= 12 \text{ рад/с}^2, \quad \varepsilon_{BCz} = -159 \text{ рад/с}^2, \\ OA &= 3, \quad AB = 3\sqrt{2}, \quad BC = 2, \quad CD = 1. \end{aligned}$$

Задача K20.7.

3



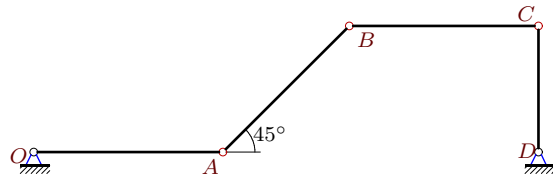
$$\omega_{OAz} = -8 \text{ рад/с}, \omega_{BCz} = -2 \text{ рад/с},$$

$$\varepsilon_{BCz} = -14 \text{ рад/с}^2, \varepsilon_{CDz} = -16 \text{ рад/с}^2,$$

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

Задача K20.8.

3



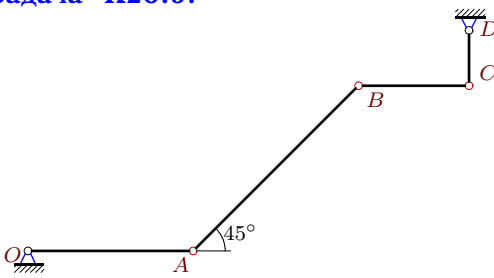
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{CDz} = -12 \text{ рад/с},$$

$$\varepsilon_{OAz} = 12 \text{ рад/с}^2, \varepsilon_{BCz} = 116 \text{ рад/с}^2,$$

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

Задача K20.9.

3



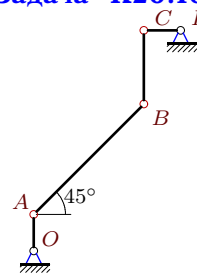
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{BCz} = 114 \text{ рад/с}^2, \varepsilon_{CDz} = -6 \text{ рад/с}^2,$$

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

Задача K20.10.

3



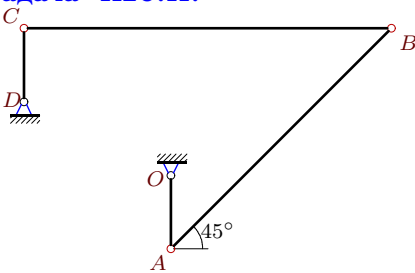
$$\omega_{OAz} = -6 \text{ рад/с}, \omega_{CDz} = 6 \text{ рад/с},$$

$$\varepsilon_{OAz} = 6 \text{ рад/с}^2, \varepsilon_{BCz} = -93 \text{ рад/с}^2,$$

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

Задача K20.11.

3



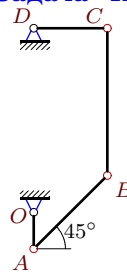
$$\omega_{BCz} = -3 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = -45 \text{ рад/с}^2, \varepsilon_{CDz} = -15 \text{ рад/с}^2,$$

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

Задача K20.12.

3



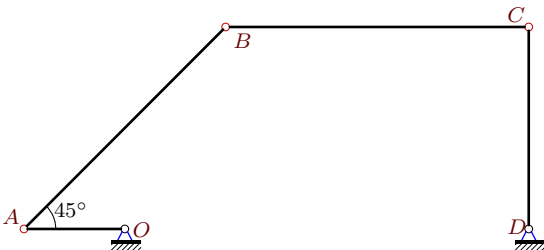
$$\omega_{BCz} = -2 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

Задача K20.13.

3



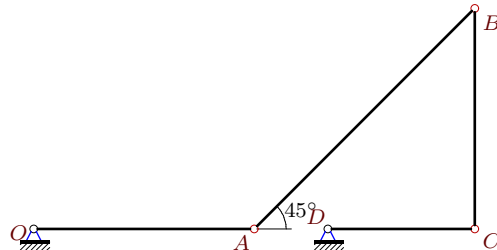
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{BCz} = 2 \text{ рад/с},$$

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

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

Задача K20.14.

3



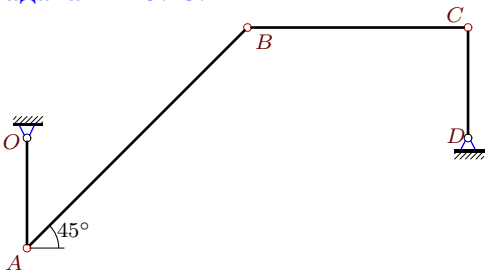
$$\omega_{OAz} = 9 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = 18 \text{ рад/с}^2, \varepsilon_{CDz} = 9 \text{ рад/с}^2,$$

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

Задача K20.15.

3



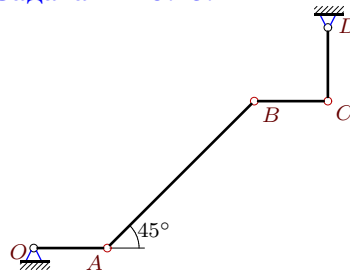
$$\omega_{BCz} = -4 \text{ рад/с}, \omega_{CDz} = 4 \text{ рад/с},$$

$$\varepsilon_{BCz} = 30 \text{ рад/с}^2, \varepsilon_{CDz} = 4 \text{ рад/с}^2,$$

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

Задача K20.16.

3



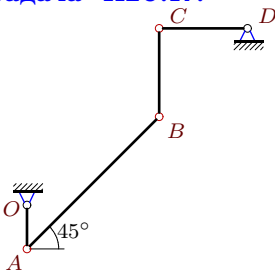
$$\omega_{OAz} = 2 \text{ рад/с}, \omega_{BCz} = 0,$$

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

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

Задача K20.17.

3



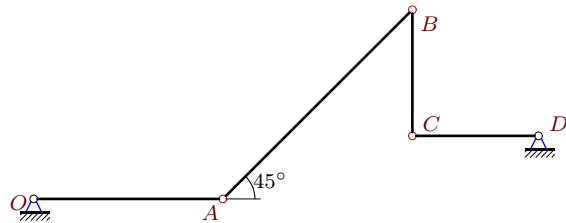
$$\omega_{OAz} = -6 \text{ рад/с}, \omega_{BCz} = -15 \text{ рад/с},$$

$$\varepsilon_{OAz} = -18 \text{ рад/с}^2, \varepsilon_{BCz} = -552 \text{ рад/с}^2,$$

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

Задача K20.18.

3



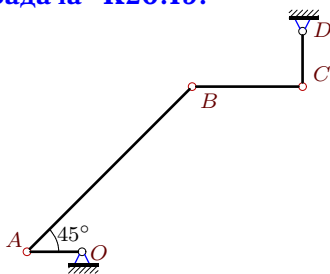
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{CDz} = 12 \text{ рад/с},$$

$$\varepsilon_{OAz} = 12 \text{ рад/с}^2, \varepsilon_{BCz} = 321 \text{ рад/с}^2,$$

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

Задача K20.19.

3



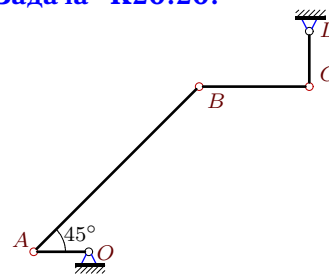
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{BCz} = -9 \text{ рад/с}^2, \varepsilon_{CDz} = 6 \text{ рад/с}^2,$$

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

Задача K20.20.

3



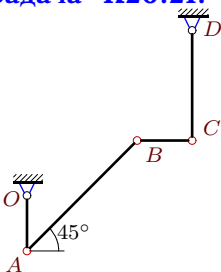
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{BCz} = 3 \text{ рад/с},$$

$$\varepsilon_{BCz} = -9 \text{ рад/с}^2, \varepsilon_{CDz} = 6 \text{ рад/с}^2,$$

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

Задача K20.21.

3



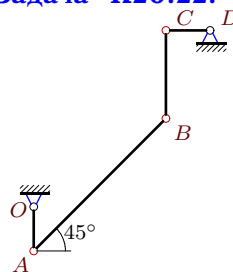
$$\omega_{BCz} = -2 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

Задача K20.22.

3



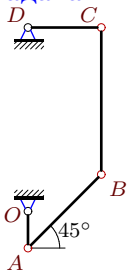
$$\omega_{BCz} = \omega_{CDz} = -6 \text{ рад/с},$$

$$\varepsilon_{OAz} = 0, \varepsilon_{BCz} = -45 \text{ рад/с}^2,$$

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

Задача K20.23.

3



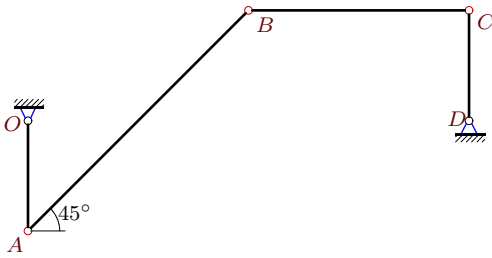
$$\omega_{BCz} = -2 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

Задача K20.25.

3



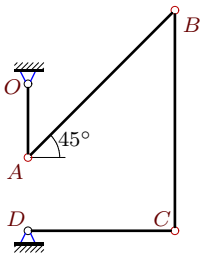
$$\omega_{OAz} = 4 \text{ рад/с}, \omega_{BCz} = 0,$$

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

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

Задача K20.27.

3



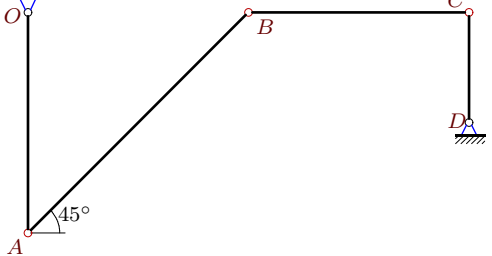
$$\omega_{BCz} = -2 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

Задача K20.29.

3



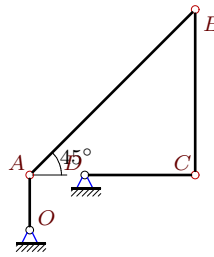
$$\omega_{OAz} = 4 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = 4 \text{ рад/с}^2, \varepsilon_{BCz} = 30 \text{ рад/с}^2,$$

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

Задача K20.24.

3



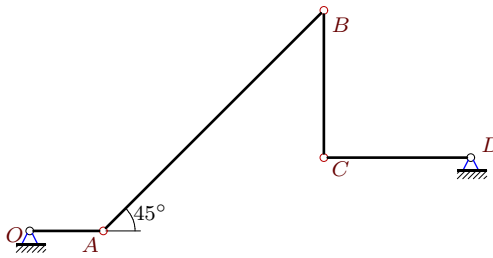
$$\omega_{OAz} = 9 \text{ рад/с}, \omega_{CDz} = -18 \text{ рад/с},$$

$$\varepsilon_{OAz} = -9 \text{ рад/с}^2, \varepsilon_{BCz} = 15 \text{ рад/с}^2,$$

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

Задача K20.26.

3



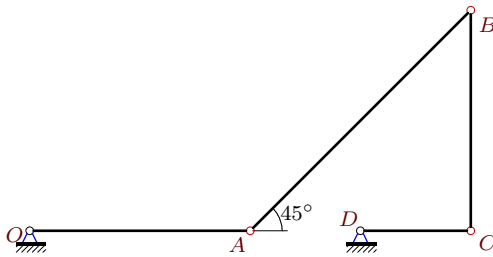
$$\omega_{BCz} = -3 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{BCz} = 27 \text{ рад/с}^2, \varepsilon_{CDz} = -6 \text{ рад/с}^2,$$

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

Задача K20.28.

3



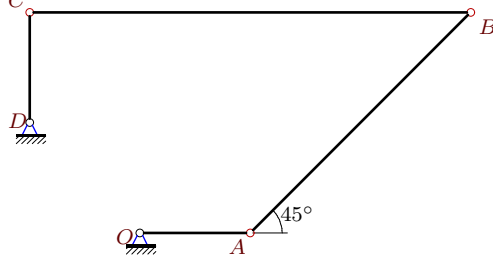
$$\omega_{OAz} = 4 \text{ рад/с}, \omega_{BCz} = -4 \text{ рад/с},$$

$$\varepsilon_{OAz} = 4 \text{ рад/с}^2, \varepsilon_{BCz} = 30 \text{ рад/с}^2,$$

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

Задача K20.30.

3



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

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

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

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	—	0	—	-5	—	2
2	-2	-2	—	—	—	1	—	0
3	4	0	—	—	—	2	—	-4
4	2	1	—	—	—	-4	—	2
5	—	4	—	0	—	28	-38	—
6	6	0	—	—	—	-94	—	12
7	—	0	—	0	8	-32	—	—
8	—	-12	2	—	—	-192	—	12
9	—	0	-9	—	12	-88	—	—
10	—	-2	6	—	—	44	—	-12
11	-15	-5	—	—	—	-30	12	—
12	-8	0	—	—	—	-40	18	—
13	—	0	—	0	—	18	-14	—
14	—	-9	-9	—	—	-12	150	—
15	4	4	—	—	0	-30	—	—
16	—	-1	—	2	—	-3	—	0
17	—	8	—	-12	—	202	—	0
18	—	-14	-21	—	—	-114	—	6
19	—	0	3	—	-6	4	—	—
20	—	0	—	0	-6	4	—	—
21	2	1	—	—	—	-2	2	—
22	-6	2	—	—	—	14	—	6
23	-8	0	—	—	—	-32	18	—
24	—	-12	-9	—	—	90	—	0
25	—	0	—	-4	—	4	—	8
26	6	-2	—	—	0	2	—	—
27	6	0	—	—	—	-18	-12	—
28	—	-4	—	0	—	-2	—	4
29	—	4	-4	—	—	-30	—	-4
30	—	0	-2	—	8	-20	—	—

К20 файл о20к3А