

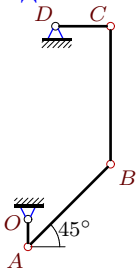
Уравнение трех угловых ускорений. Две степени свободы

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.

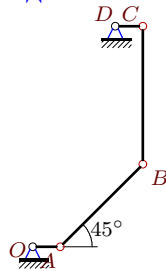
8



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

Задача K20.2.

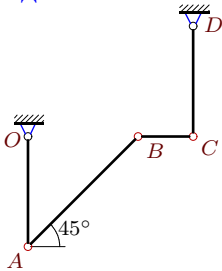
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$$\begin{aligned} \omega_{OAz} &= -15 \text{ рад/с}, \quad \omega_{BCz} = -3 \text{ рад/с}, \\ \varepsilon_{OAz} &= 15 \text{ рад/с}^2, \quad \varepsilon_{BCz} = -78 \text{ рад/с}^2, \\ OA &= 1, \quad AB = 3\sqrt{2}, \quad BC = 5, \quad CD = 1. \end{aligned}$$

Задача K20.3.

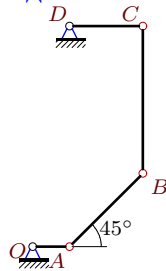
8



$$\begin{aligned} \omega_{OAz} &= 2 \text{ рад/с}, \quad \omega_{BCz} = -4 \text{ рад/с}, \\ \varepsilon_{OAz} &= 2 \text{ рад/с}^2, \quad \varepsilon_{BCz} = 28 \text{ рад/с}^2, \\ OA &= 2, \quad AB = 2\sqrt{2}, \quad BC = 1, \quad CD = 2. \end{aligned}$$

Задача K20.4.

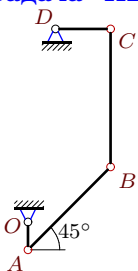
8



$$\begin{aligned} \omega_{OAz} &= -8 \text{ рад/с}, \quad \omega_{BCz} = -2 \text{ рад/с}, \\ \varepsilon_{BCz} &= -36 \text{ рад/с}^2, \quad \varepsilon_{CDz} = -8 \text{ рад/с}^2, \\ OA &= 1, \quad AB = 2\sqrt{2}, \quad BC = 4, \quad CD = 2. \end{aligned}$$

Задача K20.5.

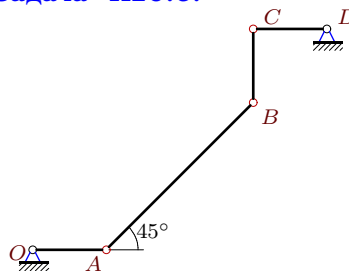
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$$\begin{aligned} \omega_{OAz} &= -15 \text{ рад/с}, \quad \omega_{CDz} = 0, \\ \varepsilon_{OAz} &= -30 \text{ рад/с}^2, \quad \varepsilon_{CDz} = -15 \text{ рад/с}^2, \\ OA &= 1, \quad AB = 3\sqrt{2}, \quad BC = 5, \quad CD = 2. \end{aligned}$$

Задача K20.6.

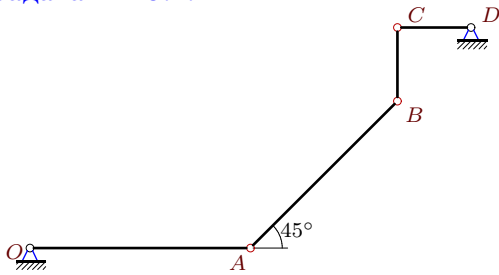
8



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

Задача K20.7.

8



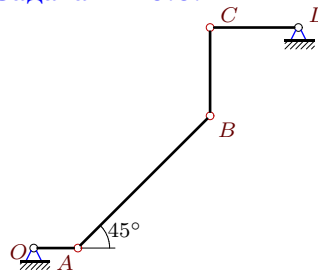
$$\omega_{OAz} = -2 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = -4 \text{ рад/с}^2, \varepsilon_{BCz} = -98 \text{ рад/с}^2,$$

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

Задача K20.8.

8



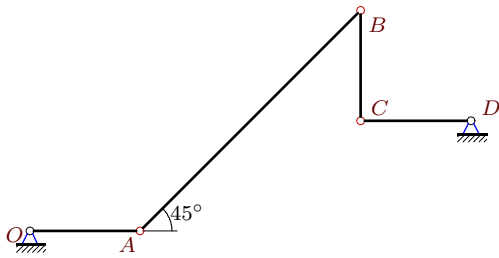
$$\omega_{OAz} = -6 \text{ рад/с}, \omega_{BCz} = -15 \text{ рад/с},$$

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

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

Задача K20.9.

8



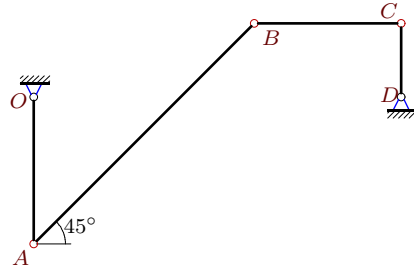
$$\omega_{BCz} = 0, \omega_{CDz} = -2 \text{ рад/с},$$

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

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

Задача K20.10.

8



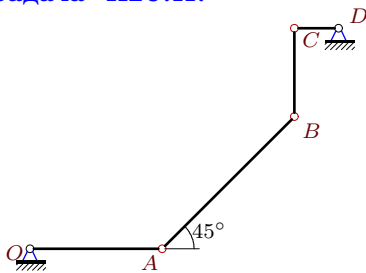
$$\omega_{BCz} = -6 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

Задача K20.11.

8



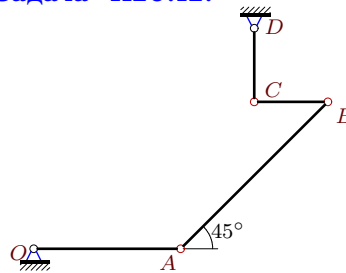
$$\omega_{OAz} = -6 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

Задача K20.12.

8



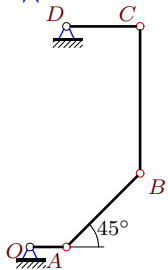
$$\omega_{OAz} = -2 \text{ рад/с}, \omega_{CDz} = 2 \text{ рад/с},$$

$$\varepsilon_{BCz} = 16 \text{ рад/с}^2, \varepsilon_{CDz} = 0,$$

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

Задача K20.13.

8



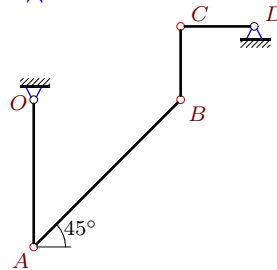
$$\omega_{BCz} = 6 \text{ рад/с}, \omega_{CDz} = -16 \text{ рад/с},$$

$$\varepsilon_{OAz} = -16 \text{ рад/с}^2, \varepsilon_{BCz} = -76 \text{ рад/с}^2,$$

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

Задача K20.14.

8



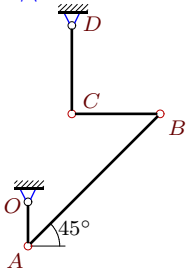
$$\omega_{BCz} = -4 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

Задача K20.15.

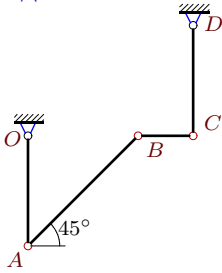
8



$\omega_{OAz} = -6 \text{ рад/с}, \omega_{CDz} = -12 \text{ рад/с},$
 $\varepsilon_{OAz} = 0, \varepsilon_{BCz} = -159 \text{ рад/с}^2,$
 $OA = 1, AB = 3\sqrt{2}, BC = CD = 2.$

Задача K20.17.

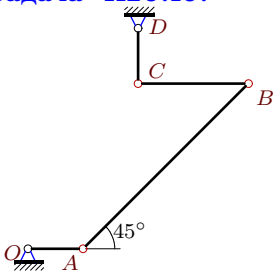
8



$\omega_{BCz} = -4 \text{ рад/с}, \omega_{CDz} = 0,$
 $\varepsilon_{OAz} = 2 \text{ рад/с}^2, \varepsilon_{BCz} = 24 \text{ рад/с}^2,$
 $OA = 2, AB = 2\sqrt{2}, BC = 1, CD = 2.$

Задача K20.19.

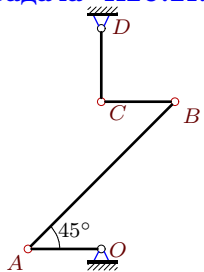
8



$\omega_{BCz} = -6 \text{ рад/с}, \omega_{CDz} = 6 \text{ рад/с},$
 $\varepsilon_{OAz} = 0, \varepsilon_{CDz} = -6 \text{ рад/с}^2,$
 $OA = 1, AB = 3\sqrt{2}, BC = 2, CD = 1.$

Задача K20.21.

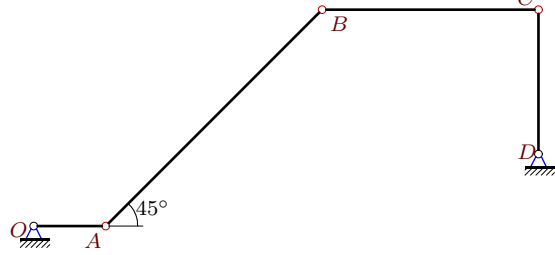
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$\omega_{OAz} = -2 \text{ рад/с}, \omega_{CDz} = 2 \text{ рад/с},$
 $\varepsilon_{OAz} = \varepsilon_{CDz} = 2 \text{ рад/с}^2,$
 $OA = 1, AB = 2\sqrt{2}, BC = CD = 1.$

Задача K20.16.

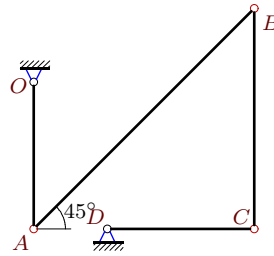
8



$\omega_{OAz} = 9 \text{ рад/с}, \omega_{CDz} = -18 \text{ рад/с},$
 $\varepsilon_{OAz} = 27 \text{ рад/с}^2, \varepsilon_{BCz} = 171 \text{ рад/с}^2,$
 $OA = 1, AB = 3\sqrt{2}, BC = 3, CD = 2.$

Задача K20.18.

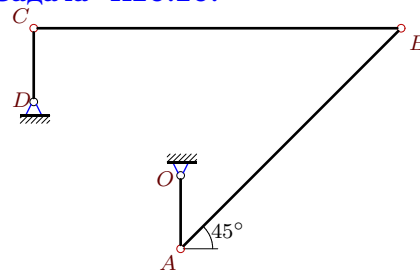
8



$\omega_{OAz} = 9 \text{ рад/с}, \omega_{BCz} = -6 \text{ рад/с},$
 $\varepsilon_{BCz} = -90 \text{ рад/с}^2, \varepsilon_{CDz} = 9 \text{ рад/с}^2,$
 $OA = 2, AB = 3\sqrt{2}, BC = 3, CD = 2.$

Задача K20.20.

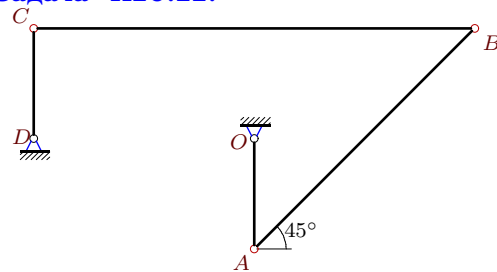
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$\omega_{BCz} = -3 \text{ рад/с}, \omega_{CDz} = 0,$
 $\varepsilon_{OAz} = -30 \text{ рад/с}^2, \varepsilon_{CDz} = -15 \text{ рад/с}^2,$
 $OA = 1, AB = 3\sqrt{2}, BC = 5, CD = 1.$

Задача K20.22.

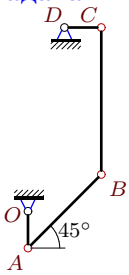
8



$\omega_{OAz} = -8 \text{ рад/с}, \omega_{BCz} = 0,$
 $\varepsilon_{BCz} = 32 \text{ рад/с}^2, \varepsilon_{CDz} = 8 \text{ рад/с}^2,$
 $OA = 1, AB = 2\sqrt{2}, BC = 4, CD = 1.$

Задача K20.23.

8



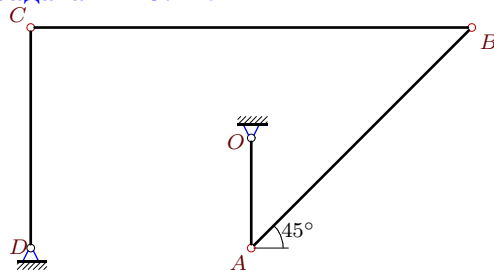
$$\omega_{OAz} = -8 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

Задача K20.24.

8



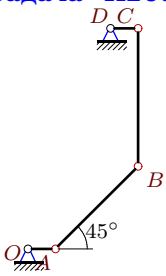
$$\omega_{OAz} = -8 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

Задача K20.25.

8



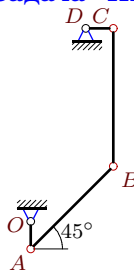
$$\omega_{OAz} = -15 \text{ рад/с}, \omega_{CDz} = 15 \text{ рад/с},$$

$$\varepsilon_{OAz} = -15 \text{ рад/с}^2, \varepsilon_{BCz} = -156 \text{ рад/с}^2,$$

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

Задача K20.26.

8



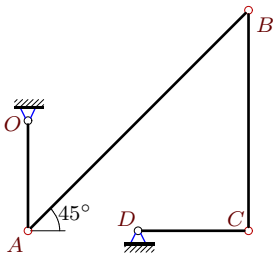
$$\omega_{OAz} = -15 \text{ рад/с}, \omega_{CDz} = 15 \text{ рад/с},$$

$$\varepsilon_{OAz} = -15 \text{ рад/с}^2, \varepsilon_{BCz} = 18 \text{ рад/с}^2,$$

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

Задача K20.27.

8



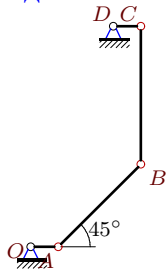
$$\omega_{OAz} = 4 \text{ рад/с}, \omega_{BCz} = -2 \text{ рад/с},$$

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

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

Задача K20.28.

8



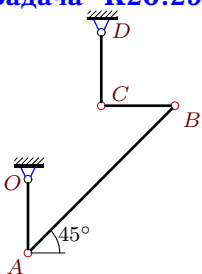
$$\omega_{OAz} = \omega_{CDz} = -15 \text{ рад/с},$$

$$\varepsilon_{BCz} = -6 \text{ рад/с}^2, \varepsilon_{CDz} = 15 \text{ рад/с}^2,$$

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

Задача K20.29.

8



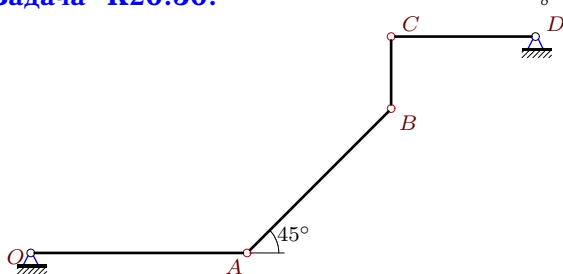
$$\omega_{OAz} = \omega_{BCz} = -2 \text{ рад/с},$$

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

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

Задача K20.30.

8



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

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

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

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	39	—
2	—	5	—	0	—	30	—	-15
3	—	2	—	0	—	-14	—	4
4	—	4	—	0	-16	24	—	—
5	—	0	-3	—	—	-70	36	—
6	-2	0	—	—	—	2	-12	—
7	—	3	-6	—	—	34	—	-2
8	—	10	—	-12	—	254	-693	—
9	2	0	—	—	—	-2	4	—
10	6	4	—	—	—	-34	39	—
11	—	6	-9	—	—	104	-264	—
12	—	-1	-6	—	-2	13	—	—
13	-8	-12	—	—	—	232	—	8
14	-2	0	—	—	—	3	-10	—
15	—	6	9	—	—	14	—	6
16	—	-12	9	—	—	-252	—	0
17	2	2	—	—	—	-12	—	2
18	—	0	—	0	9	-84	—	—
19	-6	-2	—	—	—	10	-9	—
20	-15	-5	—	—	—	-25	15	—
21	—	-1	0	—	—	0	-8	—
22	—	0	—	8	-8	0	—	—
23	—	0	-2	—	-24	-28	—	—
24	—	-4	-2	—	—	-12	—	-8
25	—	10	-6	—	—	160	—	-15
26	—	5	-6	—	—	15	—	15
27	—	0	—	0	—	-14	-14	—
28	—	0	0	—	-15	10	—	—
29	—	-1	—	0	-6	-1	—	—
30	-2	-1	—	—	—	13	-72	—

К20 файл о20к8А