

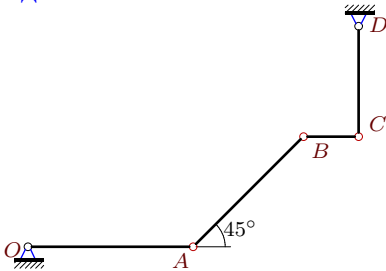
## Уравнение трех угловых ускорений. Две степени свободы

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.

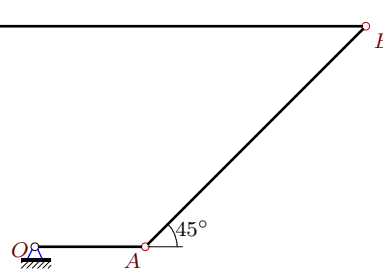
6



$$\begin{aligned} \omega_{OAz} &= 2 \text{ рад/с}, \quad \omega_{CDz} = 4 \text{ рад/с}, \\ \varepsilon_{BCz} &= 108 \text{ рад/с}^2, \quad \varepsilon_{CDz} = 4 \text{ рад/с}^2, \\ OA &= 3, \quad AB = 2\sqrt{2}, \quad BC = 1, \quad CD = 2. \end{aligned}$$

### Задача K20.2.

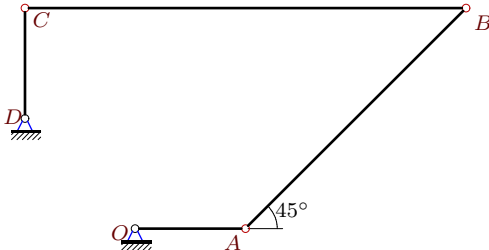
6



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

### Задача K20.3.

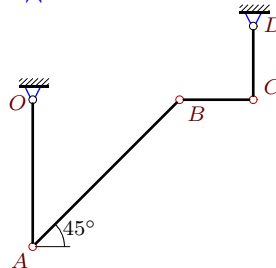
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$$\begin{aligned} \omega_{OAz} &= -8 \text{ рад/с}, \quad \omega_{CDz} = 8 \text{ рад/с}, \\ \varepsilon_{OAz} &= -24 \text{ рад/с}^2, \quad \varepsilon_{CDz} = 0, \\ OA &= 1, \quad AB = 2\sqrt{2}, \quad BC = 4, \quad CD = 1. \end{aligned}$$

### Задача K20.4.

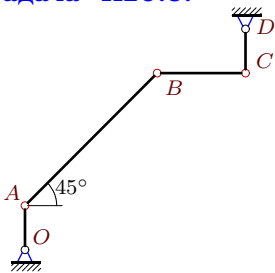
6



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

### Задача K20.5.

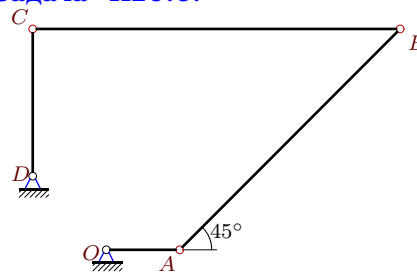
6



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

### Задача K20.6.

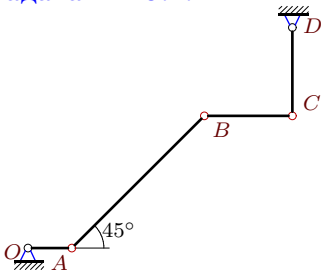
6



$$\begin{aligned} \omega_{OAz} &= -15 \text{ рад/с}, \quad \omega_{BCz} = -3 \text{ рад/с}, \\ \varepsilon_{OAz} &= 0, \quad \varepsilon_{BCz} = -48 \text{ рад/с}^2, \\ OA &= 1, \quad AB = 3\sqrt{2}, \quad BC = 5, \quad CD = 2. \end{aligned}$$

**Задача K20.7.**

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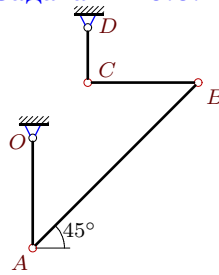
$$\omega_{BCz} = -3 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = 18 \text{ рад/с}^2, \varepsilon_{BCz} = 24 \text{ рад/с}^2,$$

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

**Задача K20.8.**

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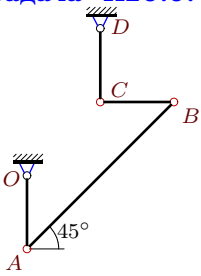
$$\omega_{BCz} = -6 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

**Задача K20.9.**

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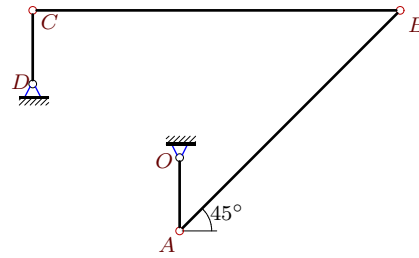
$$\omega_{OAz} = -2 \text{ рад/с}, \omega_{CDz} = 2 \text{ рад/с},$$

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

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

**Задача K20.10.**

6



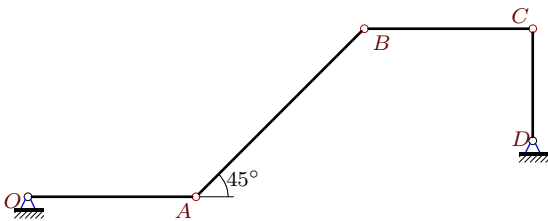
$$\omega_{OAz} = -15 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

**Задача K20.11.**

6



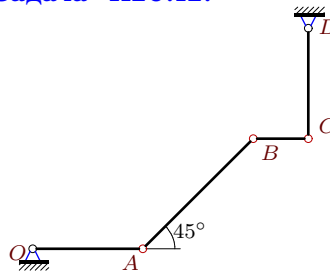
$$\omega_{OAz} = 9 \text{ рад/с}, \omega_{BCz} = 3 \text{ рад/с},$$

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

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

**Задача K20.12.**

6



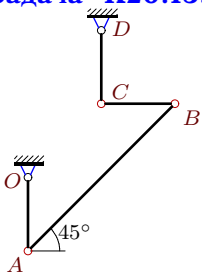
$$\omega_{BCz} = -4 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{BCz} = 24 \text{ рад/с}^2, \varepsilon_{CDz} = 2 \text{ рад/с}^2,$$

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

**Задача K20.13.**

6



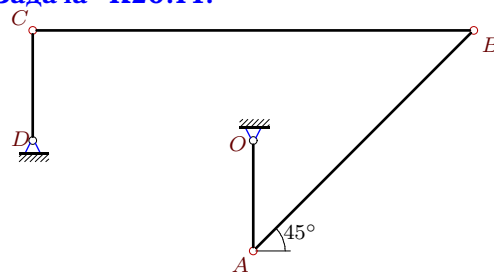
$$\omega_{OAz} = -2 \text{ рад/с}, \omega_{BCz} = -4 \text{ рад/с},$$

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

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

**Задача K20.14.**

6



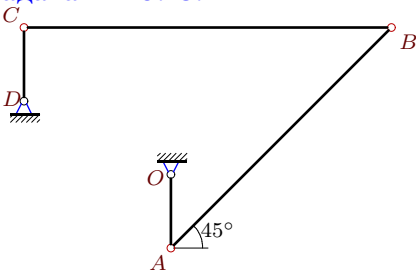
$$\omega_{BCz} = -4 \text{ рад/с}, \omega_{CDz} = -8 \text{ рад/с},$$

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

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

**Задача K20.15.**

6



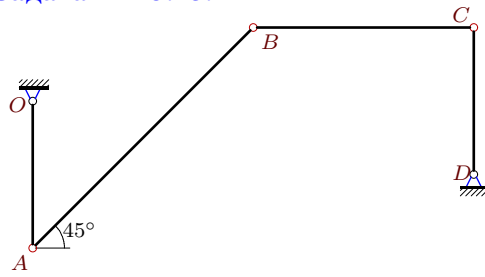
$$\omega_{OAz} = -15 \text{ рад/с}, \omega_{BCz} = 0,$$

$$\varepsilon_{BCz} = 93 \text{ рад/с}^2, \varepsilon_{CDz} = 0,$$

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

**Задача K20.16.**

6



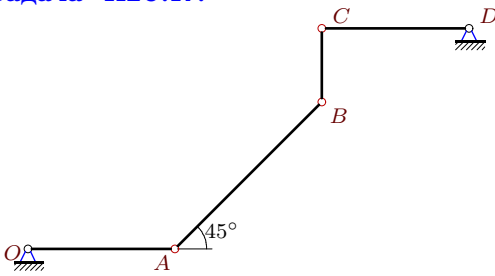
$$\omega_{OAz} = 9 \text{ рад/с}, \omega_{BCz} = -18 \text{ рад/с},$$

$$\varepsilon_{BCz} = 684 \text{ рад/с}^2, \varepsilon_{CDz} = 18 \text{ рад/с}^2,$$

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

**Задача K20.17.**

6



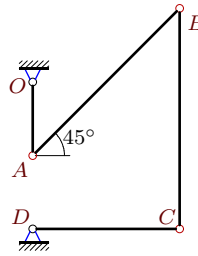
$$\omega_{OAz} = -2 \text{ рад/с}, \omega_{BCz} = 4 \text{ рад/с},$$

$$\varepsilon_{BCz} = -76 \text{ рад/с}^2, \varepsilon_{CDz} = 0,$$

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

**Задача K20.18.**

6



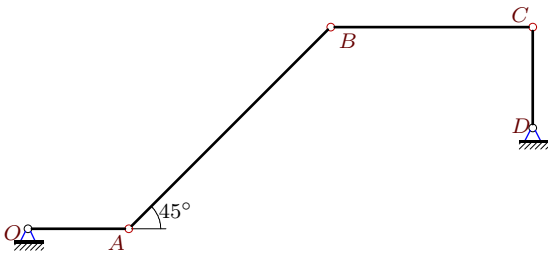
$$\omega_{BCz} = -2 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

**Задача K20.19.**

6



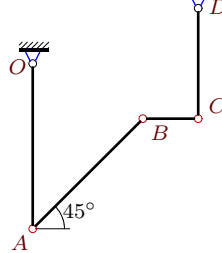
$$\omega_{BCz} = -2 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

**Задача K20.20.**

6



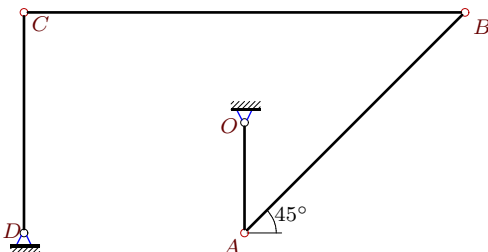
$$\omega_{OAz} = 2 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = 4 \text{ рад/с}^2, \varepsilon_{BCz} = 52 \text{ рад/с}^2,$$

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

**Задача K20.21.**

6



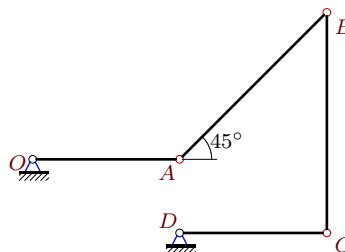
$$\omega_{OAz} = -8 \text{ рад/с}, \omega_{BCz} = -2 \text{ рад/с},$$

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

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

**Задача K20.22.**

6



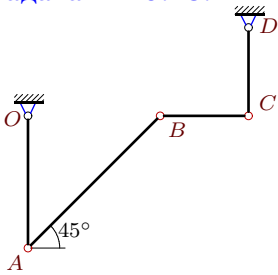
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{CDz} = 12 \text{ рад/с},$$

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

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

**Задача K20.23.**

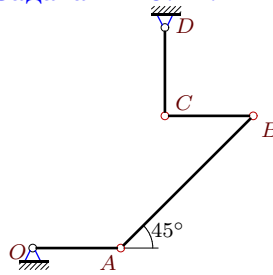
6



$\omega_{OAz} = 6 \text{ рад/с}, \omega_{BCz} = -9 \text{ рад/с},$   
 $\varepsilon_{BCz} = 123 \text{ рад/с}^2, \varepsilon_{CDz} = 6 \text{ рад/с}^2,$   
 $OA = 3, AB = 3\sqrt{2}, BC = CD = 2.$

**Задача K20.24.**

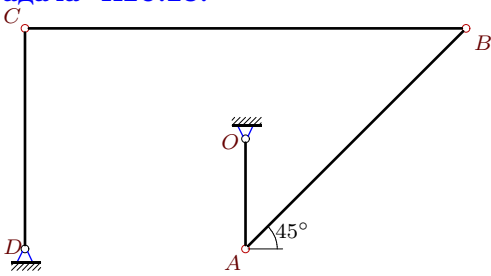
6



$\omega_{OAz} = -6 \text{ рад/с}, \omega_{BCz} = 6 \text{ рад/с},$   
 $\varepsilon_{BCz} = -348 \text{ рад/с}^2, \varepsilon_{CDz} = 6 \text{ рад/с}^2,$   
 $OA = 2, AB = 3\sqrt{2}, BC = CD = 2.$

**Задача K20.25.**

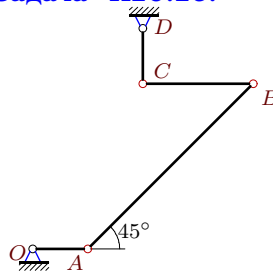
6



$\omega_{OAz} = -8 \text{ рад/с}, \omega_{BCz} = 6 \text{ рад/с},$   
 $\varepsilon_{BCz} = 32 \text{ рад/с}^2, \varepsilon_{CDz} = -8 \text{ рад/с}^2,$   
 $OA = 1, AB = 2\sqrt{2}, BC = 4, CD = 2.$

**Задача K20.26.**

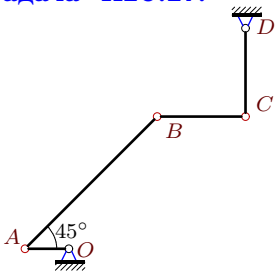
6



$\omega_{OAz} = -6 \text{ рад/с}, \omega_{BCz} = 0,$   
 $\varepsilon_{OAz} = 0, \varepsilon_{BCz} = -45 \text{ рад/с}^2,$   
 $OA = 1, AB = 3\sqrt{2}, BC = 2, CD = 1.$

**Задача K20.27.**

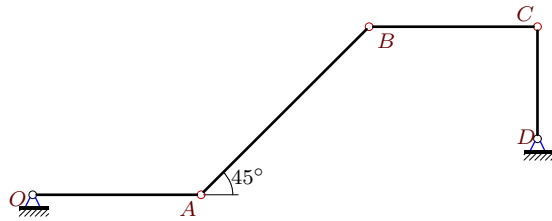
6



$\omega_{BCz} = -9 \text{ рад/с}, \omega_{CDz} = -12 \text{ рад/с},$   
 $\varepsilon_{OAz} = -6 \text{ рад/с}^2, \varepsilon_{CDz} = 12 \text{ рад/с}^2,$   
 $OA = 1, AB = 3\sqrt{2}, BC = CD = 2.$

**Задача K20.28.**

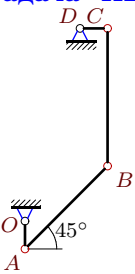
6



$\omega_{OAz} = 9 \text{ рад/с}, \omega_{BCz} = -9 \text{ рад/с},$   
 $\varepsilon_{OAz} = 18 \text{ рад/с}^2, \varepsilon_{BCz} = 138 \text{ рад/с}^2,$   
 $OA = 3, AB = 3\sqrt{2}, BC = 3, CD = 2.$

**Задача K20.29.**

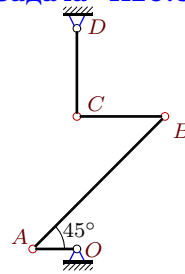
6



$\omega_{BCz} = -3 \text{ рад/с}, \omega_{CDz} = 0,$   
 $\varepsilon_{OAz} = -45 \text{ рад/с}^2, \varepsilon_{CDz} = -15 \text{ рад/с}^2,$   
 $OA = 1, AB = 3\sqrt{2}, BC = 5, CD = 1.$

**Задача K20.30.**

6



$\omega_{OAz} = -6 \text{ рад/с}, \omega_{CDz} = 0,$   
 $\varepsilon_{OAz} = 6 \text{ рад/с}^2, \varepsilon_{BCz} = 30 \text{ рад/с}^2,$   
 $OA = 1, AB = 3\sqrt{2}, BC = CD = 2.$

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

13.04.2012

№	$\omega_{OAz}$	$\omega_{ABz}$	$\omega_{BCz}$	$\omega_{CDz}$	$\varepsilon_{OA}$	$\varepsilon_{AB}$	$\varepsilon_{BC}$	$\varepsilon_{CD}$
1	—	-4	2	—	4	-28	—	—
2	—	0	—	0	—	-20	-12	—
3	—	4	0	—	—	-48	-22	—
4	2	1	—	—	—	-2	—	2
5	—	-2	—	0	—	-10	39	—
6	—	0	—	0	—	-80	—	-30
7	6	0	—	—	—	-22	—	6
8	-6	-4	—	—	—	2	15	—
9	—	-2	-4	—	0	6	—	—
10	—	-5	-3	—	—	0	30	—
11	—	-12	—	-18	—	-222	132	—
12	2	0	—	—	2	-14	—	—
13	—	-2	—	2	—	3	-2	—
14	-8	-8	—	—	-8	-36	—	—
15	—	0	—	15	15	5	—	—
16	—	18	—	18	9	-630	—	—
17	—	-2	—	4	-2	14	—	—
18	6	0	—	—	18	-18	—	—
19	4	0	—	—	0	-8	—	—
20	—	3	-6	—	—	-23	—	2
21	—	-4	—	0	—	-32	—	-16
22	—	6	4	—	—	0	-48	—
23	—	6	—	0	12	-82	—	—
24	—	8	—	-12	-6	-68	—	—
25	—	12	—	16	0	-80	—	—
26	—	2	—	-6	—	-14	—	-6
27	6	8	—	—	—	-114	408	—
28	—	0	—	0	—	-156	—	9
29	-15	0	—	—	—	-65	30	—
30	—	0	3	—	—	22	—	-6

К20 файл о20к6А