

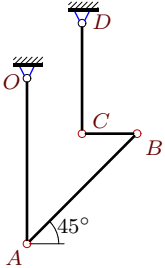
## Уравнение трех угловых ускорений. Две степени свободы

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.

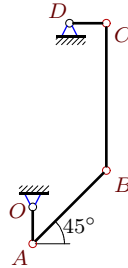
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$$\begin{aligned} \omega_{BCz} &= 2 \text{ рад/с}, \quad \omega_{CDz} = -4 \text{ рад/с}, \\ \varepsilon_{OAz} &= -4 \text{ рад/с}^2, \quad \varepsilon_{BCz} = -28 \text{ рад/с}^2, \\ OA &= 3, \quad AB = 2\sqrt{2}, \quad BC = 1, \quad CD = 2. \end{aligned}$$

### Задача К20.2.

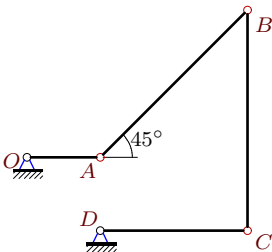
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$$\begin{aligned} \omega_{OAz} &= -8 \text{ рад/с}, \quad \omega_{CDz} = 0, \\ \varepsilon_{OAz} &= -8 \text{ рад/с}^2, \quad \varepsilon_{CDz} = -16 \text{ рад/с}^2, \\ OA &= 1, \quad AB = 2\sqrt{2}, \quad BC = 4, \quad CD = 1. \end{aligned}$$

### Задача К20.3.

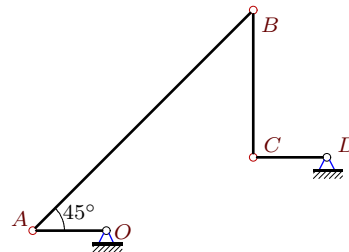
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$$\begin{aligned} \omega_{OAz} &= \omega_{BCz} = 6 \text{ рад/с}, \\ \varepsilon_{OAz} &= 0, \quad \varepsilon_{BCz} = -4 \text{ рад/с}^2, \\ OA &= 1, \quad AB = 2\sqrt{2}, \quad BC = 3, \quad CD = 2. \end{aligned}$$

### Задача К20.4.

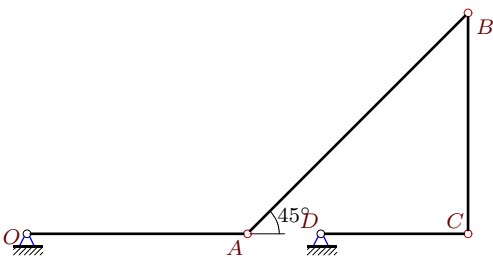
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$$\begin{aligned} \omega_{OAz} &= 6 \text{ рад/с}, \quad \omega_{BCz} = 3 \text{ рад/с}, \\ \varepsilon_{OAz} &= -6 \text{ рад/с}^2, \quad \varepsilon_{BCz} = -24 \text{ рад/с}^2, \\ OA &= 1, \quad AB = 3\sqrt{2}, \quad BC = 2, \quad CD = 1. \end{aligned}$$

### Задача К20.5.

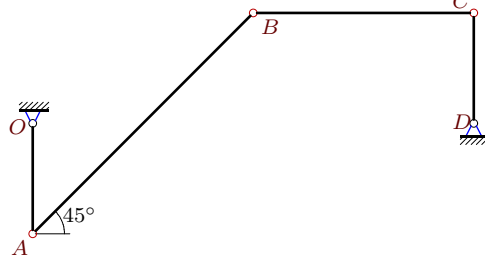
7



$$\begin{aligned} \omega_{BCz} &= -9 \text{ рад/с}, \quad \omega_{CDz} = 0, \\ \varepsilon_{OAz} &= 18 \text{ рад/с}^2, \quad \varepsilon_{CDz} = 9 \text{ рад/с}^2, \\ OA &= 3, \quad AB = 3\sqrt{2}, \quad BC = 3, \quad CD = 2. \end{aligned}$$

### Задача К20.6.

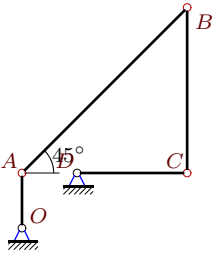
7



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

**Задача K20.7.**

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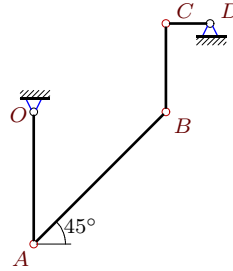
$$\omega_{BCz} = -9 \text{ рад/с}, \omega_{CDz} = -18 \text{ рад/с},$$

$$\varepsilon_{OAz} = -9 \text{ рад/с}^2, \varepsilon_{BCz} = 21 \text{ рад/с}^2,$$

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

**Задача K20.8.**

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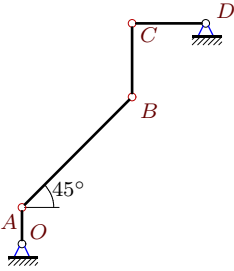
$$\omega_{OAz} = \omega_{BCz} = -6 \text{ рад/с},$$

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

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

**Задача K20.9.**

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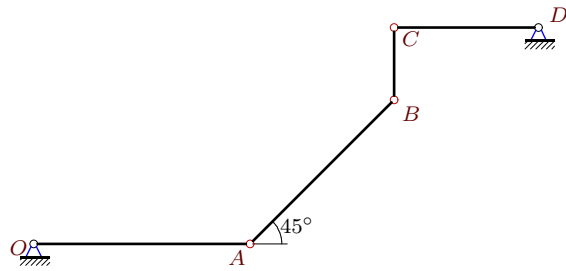
$$\omega_{OAz} = -6 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

**Задача K20.10.**

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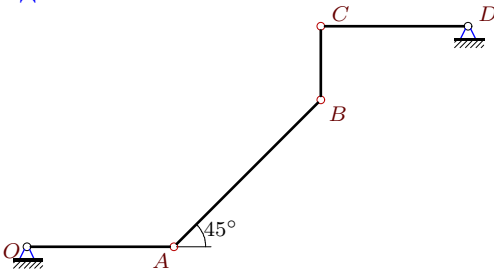
$$\omega_{OAz} = -2 \text{ рад/с}, \omega_{CDz} = 4 \text{ рад/с},$$

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

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

**Задача K20.11.**

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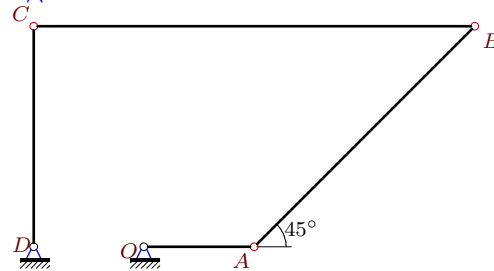
$$\omega_{BCz} = -12 \text{ рад/с}, \omega_{CDz} = -4 \text{ рад/с},$$

$$\varepsilon_{OAz} = -2 \text{ рад/с}^2, \varepsilon_{BCz} = -332 \text{ рад/с}^2,$$

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

**Задача K20.12.**

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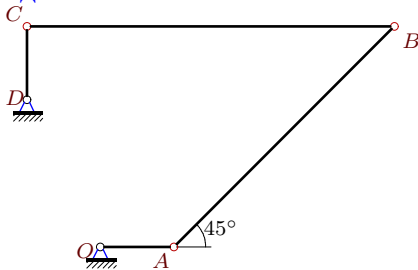
$$\omega_{OAz} = -8 \text{ рад/с}, \omega_{BCz} = -10 \text{ рад/с},$$

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

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

**Задача K20.13.**

7



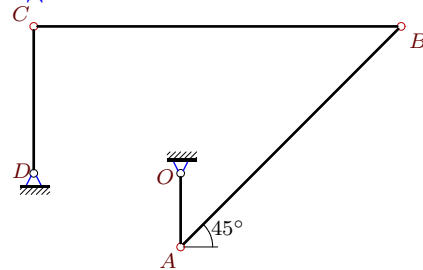
$$\omega_{OAz} = -15 \text{ рад/с}, \omega_{CDz} = 0,$$

$$\varepsilon_{OAz} = 0, \varepsilon_{BCz} = -33 \text{ рад/с}^2,$$

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

**Задача K20.14.**

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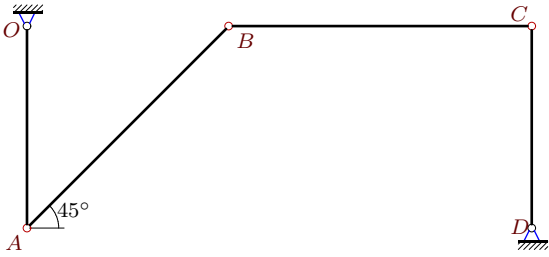
$$\omega_{OAz} = -15 \text{ рад/с}, \omega_{CDz} = 30 \text{ рад/с},$$

$$\varepsilon_{OAz} = -30 \text{ рад/с}^2, \varepsilon_{BCz} = 204 \text{ рад/с}^2,$$

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

**Задача K20.15.**

7



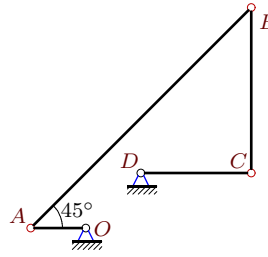
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{BCz} = -4 \text{ рад/с},$$

$$\varepsilon_{BCz} = 32 \text{ рад/с}^2, \varepsilon_{CDz} = 6 \text{ рад/с}^2,$$

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

**Задача K20.16.**

7



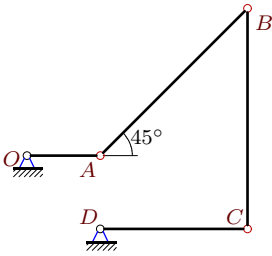
$$\omega_{OAz} = 12 \text{ рад/с}, \omega_{CDz} = -24 \text{ рад/с},$$

$$\varepsilon_{BCz} = -356 \text{ рад/с}^2, \varepsilon_{CDz} = 12 \text{ рад/с}^2,$$

$$OA = 1, AB = 4\sqrt{2}, BC = 3, CD = 2.$$

**Задача K20.17.**

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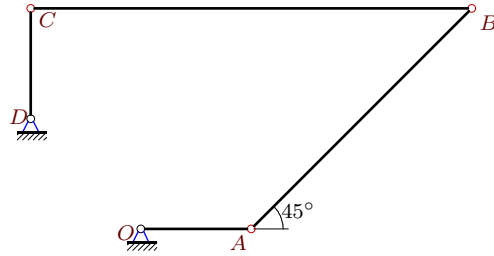
$$\omega_{OAz} = 6 \text{ рад/с}, \omega_{CDz} = 12 \text{ рад/с},$$

$$\varepsilon_{OAz} = 0, \varepsilon_{BCz} = -8 \text{ рад/с}^2,$$

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

**Задача K20.18.**

7



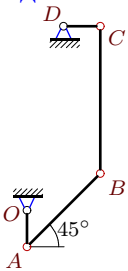
$$\omega_{OAz} = -8 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

**Задача K20.19.**

7



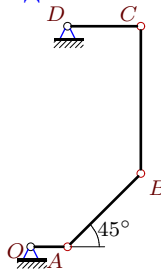
$$\omega_{OAz} = -8 \text{ рад/с}, \omega_{BCz} = -2 \text{ рад/с},$$

$$\varepsilon_{OAz} = -16 \text{ рад/с}^2, \varepsilon_{BCz} = 10 \text{ рад/с}^2,$$

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

**Задача K20.20.**

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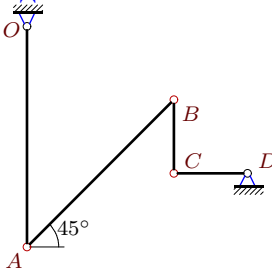
$$\omega_{BCz} = -2 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

**Задача K20.21.**

7



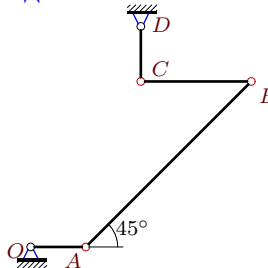
$$\omega_{BCz} = -6 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

**Задача K20.22.**

7



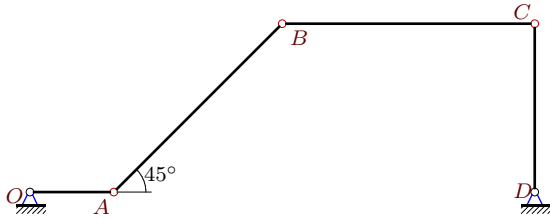
$$\omega_{OAz} = \omega_{BCz} = -6 \text{ рад/с},$$

$$\varepsilon_{OAz} = 0, \varepsilon_{BCz} = -15 \text{ рад/с}^2,$$

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

**Задача K20.23.**

7



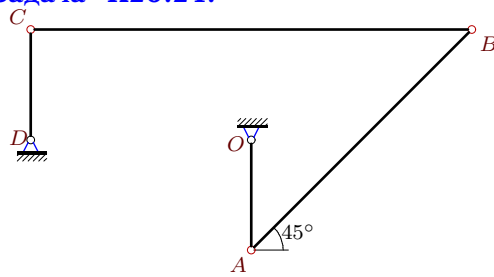
$$\omega_{BCz} = -10 \text{ рад/с}, \omega_{CDz} = 12 \text{ рад/с},$$

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

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

**Задача K20.24.**

7



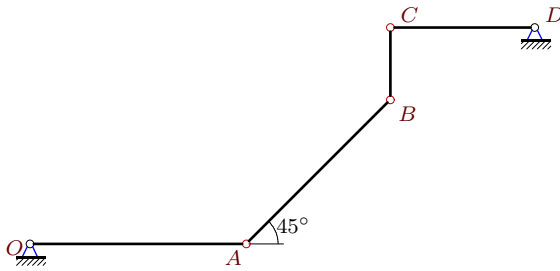
$$\omega_{BCz} = -4 \text{ рад/с}, \omega_{CDz} = -8 \text{ рад/с},$$

$$\varepsilon_{BCz} = -18 \text{ рад/с}^2, \varepsilon_{CDz} = 8 \text{ рад/с}^2,$$

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

**Задача K20.25.**

7



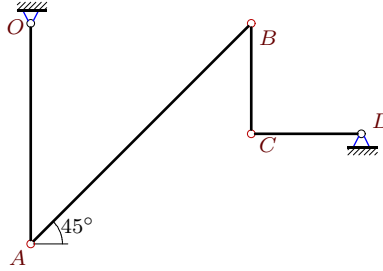
$$\omega_{OAz} = -2 \text{ рад/с}, \omega_{BCz} = -6 \text{ рад/с},$$

$$\varepsilon_{BCz} = -100 \text{ рад/с}^2, \varepsilon_{CDz} = -2 \text{ рад/с}^2,$$

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

**Задача K20.26.**

7



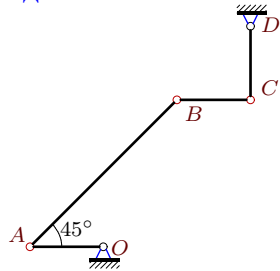
$$\omega_{OAz} = 2 \text{ рад/с}, \omega_{CDz} = -2 \text{ рад/с},$$

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

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

**Задача K20.27.**

7



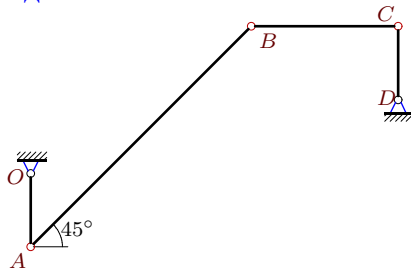
$$\omega_{BCz} = 2 \text{ рад/с}, \omega_{CDz} = 0,$$

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

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

**Задача K20.28.**

7



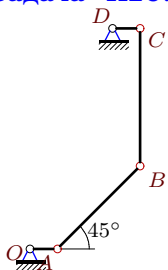
$$\omega_{OAz} = \omega_{CDz} = 6 \text{ рад/с},$$

$$\varepsilon_{BCz} = 45 \text{ рад/с}^2, \varepsilon_{CDz} = 6 \text{ рад/с}^2,$$

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

**Задача K20.29.**

7



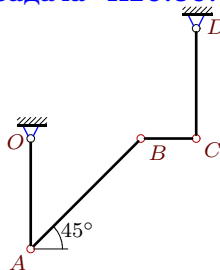
$$\omega_{BCz} = 0, \omega_{CDz} = -15 \text{ рад/с},$$

$$\varepsilon_{BCz} = -3 \text{ рад/с}^2, \varepsilon_{CDz} = -15 \text{ рад/с}^2,$$

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

**Задача K20.30.**

7



$$\omega_{OAz} = 2 \text{ рад/с}, \omega_{BCz} = -12 \text{ рад/с},$$

$$\varepsilon_{OAz} = 2 \text{ рад/с}^2, \varepsilon_{BCz} = 312 \text{ рад/с}^2,$$

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

**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	-2	1	—	—	—	-3	—	-2
2	—	0	-2	—	—	-32	14	—
3	—	9	—	12	—	39	—	12
4	—	2	—	0	—	-8	—	12
5	9	-9	—	—	—	-12	150	—
6	4	2	—	—	0	-4	—	—
7	9	-12	—	—	—	96	—	9
8	—	-2	—	6	—	-6	-33	—
9	—	0	3	—	—	22	-36	—
10	—	-1	2	—	—	11	-68	—
11	-2	6	—	—	—	110	—	0
12	—	-16	—	-16	—	-104	-54	—
13	—	0	-3	—	—	-55	—	15
14	—	15	9	—	—	-110	—	-15
15	—	6	—	0	6	-48	—	—
16	—	-9	-12	—	-12	-24	—	—
17	—	9	6	—	—	33	—	6
18	—	0	-2	—	—	-28	-12	—
19	—	0	—	0	—	-28	—	-8
20	-8	4	—	—	—	24	-36	—
21	2	0	—	—	—	-26	-64	—
22	—	-2	—	6	—	6	—	6
23	6	12	—	—	—	-318	212	—
24	-8	-8	—	—	-16	-36	—	—
25	—	3	—	0	-4	35	—	—
26	—	1	-2	—	—	-6	-10	—
27	2	0	—	—	—	-1	—	2
28	—	4	-6	—	0	-38	—	—
29	-15	0	—	—	-30	5	—	—
30	—	6	—	-4	—	-108	—	2

К20 файл о20к7А