

Уравнение Лагранжа. Определение ускорения

Дано выражение кинетической энергии и обобщенной силы механической системы с одной степенью свободы. В некоторый момент известны значения обобщенной координаты φ и скорости $\dot{\varphi}$. Найти ускорение $\ddot{\varphi}$.

Задача D32.1.

3

$$T = \frac{\dot{\varphi}^2}{2}(14 \sin^2 \varphi - 4)$$

$$Q = 160, \varphi = \pi/4, \dot{\varphi} = 4.$$

Задача D32.2.

3

$$T = \frac{\dot{\varphi}^2}{2}(14 \cos^2 \varphi - 11)$$

$$Q = -64, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.3.

3

$$T = \frac{\dot{\varphi}^2}{2}(3 \operatorname{tg}^2 \varphi - 13)$$

$$Q = -64, \varphi = \pi/4, \dot{\varphi} = 1.$$

Задача D32.4.

3

$$T = \frac{\dot{\varphi}^2}{2}(2 \operatorname{tg} \varphi - 9)$$

$$Q = 15, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.5.

3

$$T = \frac{\dot{\varphi}^2}{2}(7 \operatorname{ctg} \varphi - 5)$$

$$Q = 6, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.6.

3

$$T = \frac{\dot{\varphi}^2}{2}(4 \cos(2\varphi) - 3)$$

$$Q = -196, \varphi = \pi/4, \dot{\varphi} = 7.$$

Задача D32.7.

3

$$T = \frac{\dot{\varphi}^2}{2}(5 \sin(2\varphi) + 6 \cos^2(3\varphi))$$

$$Q = 160, \varphi = \pi/4, \dot{\varphi} = 4.$$

Задача D32.8.

3

$$T = \frac{\dot{\varphi}^2}{2}(3 \sin(2\varphi) - 14 \sin^2 \varphi + 1)$$

$$Q = -43, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.9.

3

$$T = \frac{\dot{\varphi}^2}{2}(6 \sin^2(3\varphi) + 1)$$

$$Q = -181, \varphi = \pi/4, \dot{\varphi} = 5.$$

Задача D32.10.

3

$$T = \frac{\dot{\varphi}^2}{2}(7 \sin(2\varphi) - 10 \cos^2(3\varphi))$$

$$Q = -141, \varphi = \pi/4, \dot{\varphi} = 3.$$

Задача D32.11.

3

$$T = \frac{\dot{\varphi}^2}{2}(2 \cos(2\varphi) - 1)$$

$$Q = -21, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.12.

3

$$T = \frac{\dot{\varphi}^2}{2}(10 \sin^2(3\varphi) - 2)$$

$$Q = -234, \varphi = \pi/4, \dot{\varphi} = 4.$$

Задача D32.13.

3

$$T = \frac{\dot{\varphi}^2}{2}(4 \sin(2\varphi) + 10 \cos^2(3\varphi))$$

$$Q = 213, \varphi = \pi/4, \dot{\varphi} = 4.$$

Задача D32.14.

3

$$T = \frac{\dot{\varphi}^2}{2}(7 \operatorname{tg}^2 \varphi - 11)$$

$$Q = 318, \varphi = \pi/4, \dot{\varphi} = 5.$$

Задача D32.15.

3

$$T = \frac{\dot{\varphi}^2}{2}(4 \cos^2 \varphi + 3)$$

$$Q = -28, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.16.

3

$$T = \frac{\dot{\varphi}^2}{2}(5 \operatorname{tg} \varphi + 3)$$

$$Q = 133, \varphi = \pi/4, \dot{\varphi} = 5.$$

Задача D32.17.

3

$$T = \frac{\dot{\varphi}^2}{2}(10 \cos^2 \varphi - 2)$$

$$Q = 16, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.18.

3

$$T = \frac{\dot{\varphi}^2}{2}(4 \sin^2(3\varphi) - 1)$$

$$Q = -221, \varphi = \pi/4, \dot{\varphi} = 6.$$

Задача D32.19.

3

$$T = \frac{\dot{\varphi}^2}{2}(3 \sin(2\varphi) - 26 \cos^2(3\varphi))$$

$$Q = -186, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.20.

3

$$T = \frac{\dot{\varphi}^2}{2}(3 \operatorname{tg} \varphi + 7)$$

$$Q = 138, \varphi = \pi/4, \dot{\varphi} = 4.$$

Задача D32.21.

3

$$T = \frac{\dot{\varphi}^2}{2}(7 \operatorname{tg}^2 \varphi + 3)$$

$$Q = 480, \varphi = \pi/4, \dot{\varphi} = 5.$$

Задача D32.22.

3

$$T = \frac{\dot{\varphi}^2}{2}(5 \operatorname{tg}^2 \varphi + 5)$$

$$Q = 140, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.23.

3

$$T = \frac{\dot{\varphi}^2}{2}(4 \operatorname{tg}^2 \varphi + 1)$$

$$Q = 333, \varphi = \pi/4, \dot{\varphi} = 6.$$

Задача D32.24.

3

$$T = \frac{\dot{\varphi}^2}{2}(4 \operatorname{tg} \varphi - 1)$$

$$Q = 241, \varphi = \pi/4, \dot{\varphi} = 7.$$

Задача D32.25.

3

$$T = \frac{\dot{\varphi}^2}{2}(2 \operatorname{ctg} \varphi - 9)$$

$$Q = -203, \varphi = \pi/4, \dot{\varphi} = 7.$$

Задача D32.26.

3

$$T = \frac{\dot{\varphi}^2}{2}(5 \cos(2\varphi) - 7)$$

$$Q = -66, \varphi = \pi/4, \dot{\varphi} = 3.$$

Задача D32.27.

3

$$T = \frac{\dot{\varphi}^2}{2}(14 \sin^2(3\varphi) - 1)$$

$$Q = -525, \varphi = \pi/4, \dot{\varphi} = 5.$$

Задача D32.28.

3

$$T = \frac{\dot{\varphi}^2}{2}(7 \operatorname{tg} \varphi - 9)$$

$$Q = 38, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.29.

3

$$T = \frac{\dot{\varphi}^2}{2}(7 \operatorname{tg}^2 \varphi + 1)$$

$$Q = 64, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.30.

3

$$T = \frac{\dot{\varphi}^2}{2}(4 \sin(2\varphi) + 6 \cos^2(3\varphi))$$

$$Q = 427, \varphi = \pi/4, \dot{\varphi} = 7.$$

D32 Ответы.**Уравнение Лагранжа. Определение ускорения**

27.05.2012

№	$\ddot{\varphi}$	Уравнение Лагранжа
1	16	$3\ddot{\varphi} + 7\dot{\varphi}^2 = Q$
2	9	$-4\ddot{\varphi} - 7\dot{\varphi}^2 = Q$
3	7	$-10\ddot{\varphi} + 6\dot{\varphi}^2 = Q$
4	-1	$-7\ddot{\varphi} + 2\dot{\varphi}^2 = Q$
5	17	$2\ddot{\varphi} - 7\dot{\varphi}^2 = Q$
6	0	$-3\ddot{\varphi} - 4\dot{\varphi}^2 = Q$
7	2	$8\ddot{\varphi} + 9\dot{\varphi}^2 = Q$
8	5	$-3\ddot{\varphi} - 7\dot{\varphi}^2 = Q$
9	11	$4\ddot{\varphi} - 9\dot{\varphi}^2 = Q$
10	-3	$2\ddot{\varphi} - 15\dot{\varphi}^2 = Q$
11	13	$\ddot{\varphi} - 2\dot{\varphi}^2 = Q$
12	2	$3\ddot{\varphi} - 15\dot{\varphi}^2 = Q$
13	-3	$9\ddot{\varphi} + 15\dot{\varphi}^2 = Q$
14	8	$-4\ddot{\varphi} + 14\dot{\varphi}^2 = Q$
15	-4	$5\ddot{\varphi} - 2\dot{\varphi}^2 = Q$
16	1	$8\ddot{\varphi} + 5\dot{\varphi}^2 = Q$
17	12	$3\ddot{\varphi} - 5\dot{\varphi}^2 = Q$
18	-5	$\ddot{\varphi} - 6\dot{\varphi}^2 = Q$
19	3	$-10\ddot{\varphi} - 39\dot{\varphi}^2 = Q$
20	9	$10\ddot{\varphi} + 3\dot{\varphi}^2 = Q$
21	13	$10\ddot{\varphi} + 14\dot{\varphi}^2 = Q$
22	10	$10\ddot{\varphi} + 10\dot{\varphi}^2 = Q$
23	9	$5\ddot{\varphi} + 8\dot{\varphi}^2 = Q$
24	15	$3\ddot{\varphi} + 4\dot{\varphi}^2 = Q$
25	15	$-7\ddot{\varphi} - 2\dot{\varphi}^2 = Q$
26	3	$-7\ddot{\varphi} - 5\dot{\varphi}^2 = Q$
27	0	$6\ddot{\varphi} - 21\dot{\varphi}^2 = Q$
28	-5	$-2\ddot{\varphi} + 7\dot{\varphi}^2 = Q$
29	1	$8\ddot{\varphi} + 14\dot{\varphi}^2 = Q$
30	-2	$7\ddot{\varphi} + 9\dot{\varphi}^2 = Q$

D32 файл о32d3A