

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.

2

$$T = \frac{\dot{\varphi}^2}{2}(6 \cos^2 \varphi - 7)$$

$$Q = -107, \varphi = \pi/4, \dot{\varphi} = 5.$$

Задача D32.2.

2

$$T = \frac{\dot{\varphi}^2}{2}(14 \sin^2 \varphi - 15)$$

$$Q = 71, \varphi = \pi/4, \dot{\varphi} = 3.$$

Задача D32.3.

2

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

$$Q = -76, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.4.

2

$$T = \frac{\dot{\varphi}^2}{2}(4 \cos^2 \varphi - 9)$$

$$Q = -65, \varphi = \pi/4, \dot{\varphi} = 1.$$

Задача D32.5.

2

$$T = \frac{\dot{\varphi}^2}{2}(4 \operatorname{tg}^2 \varphi - 13)$$

$$Q = 95, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.6.

2

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

$$Q = -11, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.7.

2

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

$$Q = -369, \varphi = \pi/4, \dot{\varphi} = 5.$$

Задача D32.8.

2

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

$$Q = -232, \varphi = \pi/4, \dot{\varphi} = 6.$$

Задача D32.9.

2

$$T = \frac{\dot{\varphi}^2}{2}(5 \sin(2\varphi) + 2 \sin^2 \varphi + 1)$$

$$Q = 85, \varphi = \pi/4, \dot{\varphi} = 6.$$

Задача D32.10.

2

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

$$Q = 394, \varphi = \pi/4, \dot{\varphi} = 7.$$

Задача D32.11.

2

$$T = \frac{\dot{\varphi}^2}{2}(6 \cos^2 \varphi - 13)$$

$$Q = -128, \varphi = \pi/4, \dot{\varphi} = 4.$$

Задача D32.12.

2

$$T = \frac{\dot{\varphi}^2}{2}(6 \sin^2 \varphi - 7)$$

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

Задача D32.13.

2

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

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

Задача D32.14.

2

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

$$Q = 357, \varphi = \pi/4, \dot{\varphi} = 7.$$

Задача D32.15.

2

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

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

Задача D32.16.

2

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

$$Q = -21, \varphi = \pi/4, \dot{\varphi} = 1.$$

Задача D32.17.

2

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

$$Q = 518, \varphi = \pi/4, \dot{\varphi} = 7.$$

Задача D32.18.

2

$$T = \frac{\dot{\varphi}^2}{2}(8 \sin^2(3\varphi) - 1)$$

$$Q = -303, \varphi = \pi/4, \dot{\varphi} = 5.$$

Задача D32.19.

2

$$T = \frac{\dot{\varphi}^2}{2}(4 \sin(2\varphi) - 22 \cos^2(3\varphi))$$

$$Q = -1293, \varphi = \pi/4, \dot{\varphi} = 6.$$

Задача D32.20.

2

$$T = \frac{\dot{\varphi}^2}{2}(6 \sin^2 \varphi - 7)$$

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

Задача D32.21.

2

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

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

Задача D32.22.

2

$$T = \frac{\dot{\varphi}^2}{2}(4 \cos(2\varphi) - 15)$$

$$Q = -79, \varphi = \pi/4, \dot{\varphi} = 1.$$

Задача D32.23.

2

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

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

Задача D32.24.

2

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

$$Q = 9, \varphi = \pi/4, \dot{\varphi} = 2.$$

Задача D32.25.

2

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

$$Q = 323, \varphi = \pi/4, \dot{\varphi} = 6.$$

Задача D32.26.

2

$$T = \frac{\dot{\varphi}^2}{2}(10 \cos^2 \varphi + 1)$$

$$Q = -149, \varphi = \pi/4, \dot{\varphi} = 5.$$

Задача D32.27.

2

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

$$Q = -441, \varphi = \pi/4, \dot{\varphi} = 7.$$

Задача D32.28.

2

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

$$Q = -97, \varphi = \pi/4, \dot{\varphi} = 3.$$

Задача D32.29.

2

$$T = \frac{\dot{\varphi}^2}{2}(8 \sin^2(3\varphi) - 5)$$

$$Q = -306, \varphi = \pi/4, \dot{\varphi} = 5.$$

Задача D32.30.

2

$$T = \frac{\dot{\varphi}^2}{2}(4 \sin^2(3\varphi) - 13)$$

$$Q = -57, \varphi = \pi/4, \dot{\varphi} = 2.$$

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

27.05.2012

№	$\ddot{\varphi}$	Уравнение Лагранжа
1	8	$-4\ddot{\varphi} - 3\dot{\varphi}^2 = Q$
2	-1	$-8\ddot{\varphi} + 7\dot{\varphi}^2 = Q$
3	10	$-10\ddot{\varphi} + 6\dot{\varphi}^2 = Q$
4	9	$-7\ddot{\varphi} - 2\dot{\varphi}^2 = Q$
5	-7	$-9\ddot{\varphi} + 8\dot{\varphi}^2 = Q$
6	13	$\ddot{\varphi} - 6\dot{\varphi}^2 = Q$
7	-2	$-3\ddot{\varphi} - 15\dot{\varphi}^2 = Q$
8	2	$10\ddot{\varphi} - 7\dot{\varphi}^2 = Q$
9	7	$7\ddot{\varphi} + \dot{\varphi}^2 = Q$
10	2	$\ddot{\varphi} + 8\dot{\varphi}^2 = Q$
11	8	$-10\ddot{\varphi} - 3\dot{\varphi}^2 = Q$
12	7	$-4\ddot{\varphi} + 3\dot{\varphi}^2 = Q$
13	16	$3\ddot{\varphi} - 5\dot{\varphi}^2 = Q$
14	14	$8\ddot{\varphi} + 5\dot{\varphi}^2 = Q$
15	2	$3\ddot{\varphi} - \dot{\varphi}^2 = Q$
16	-3	$5\ddot{\varphi} - 6\dot{\varphi}^2 = Q$
17	14	$2\ddot{\varphi} + 10\dot{\varphi}^2 = Q$
18	-1	$3\ddot{\varphi} - 12\dot{\varphi}^2 = Q$
19	15	$-7\ddot{\varphi} - 33\dot{\varphi}^2 = Q$
20	4	$-4\ddot{\varphi} + 3\dot{\varphi}^2 = Q$
21	13	$-2\ddot{\varphi} - 3\dot{\varphi}^2 = Q$
22	5	$-15\ddot{\varphi} - 4\dot{\varphi}^2 = Q$
23	9	$-4\ddot{\varphi} - 7\dot{\varphi}^2 = Q$
24	7	$3\ddot{\varphi} - 3\dot{\varphi}^2 = Q$
25	7	$5\ddot{\varphi} + 8\dot{\varphi}^2 = Q$
26	-4	$6\ddot{\varphi} - 5\dot{\varphi}^2 = Q$
27	0	$2\ddot{\varphi} - 9\dot{\varphi}^2 = Q$
28	8	$-2\ddot{\varphi} - 9\dot{\varphi}^2 = Q$
29	6	$\ddot{\varphi} - 12\dot{\varphi}^2 = Q$
30	3	$-11\ddot{\varphi} - 6\dot{\varphi}^2 = Q$

D32 файл о32d2A