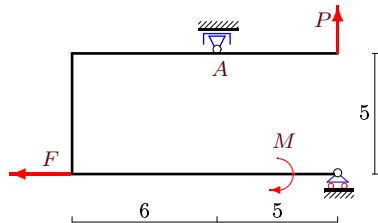


# Равновесие рамы с трением

Одна из опор рамы — негладкая неудерживающая шарнирная опора в точке  $A$  (односторонняя связь). Заданы нагрузки  $P$  и  $M$  и коэффициент трения скольжения в опоре  $A$ . Размеры на рисунке даны в метрах. Для каких значений силы  $F$  система находится в положении равновесия?

Задача S-10.1.

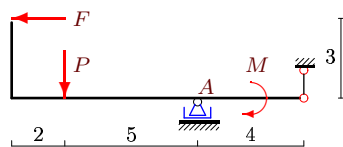
12



$$P = 13 \text{ кН}, M = 700 \text{ кНм}, f_{\text{ТР}} = 3/4.$$

Задача S-10.2.

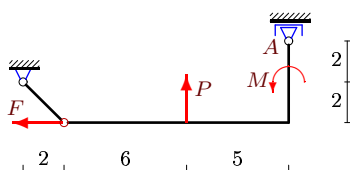
12



$$P = 11 \text{ кН}, M = 45 \text{ кНм}, f_{\text{ТР}} = 2/3.$$

Задача S-10.3.

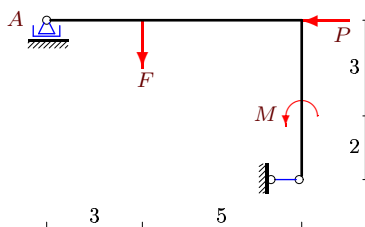
12



$$P = 39 \text{ кН}, M = 78 \text{ кНм}, f_{\text{ТР}} = 1/2.$$

Задача S-10.4.

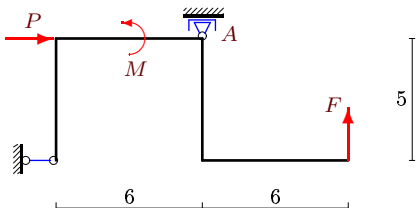
12



$$P = 2 \text{ кН}, M = 125 \text{ кНм}, f_{\text{ТР}} = 3/4.$$

Задача S-10.5.

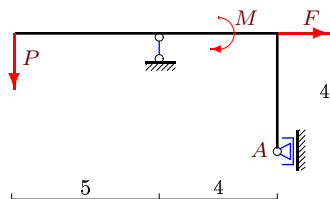
12



$$P = 819 \text{ кН}, M = 3627 \text{ кНм}, f_{\text{ТР}} = 3/4.$$

Задача S-10.6.

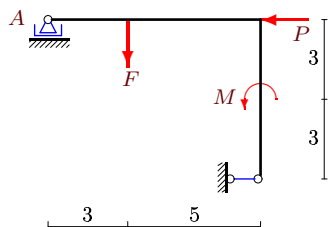
12



$$P = 51 \text{ кН}, M = 15 \text{ кНм}, f_{\text{ТР}} = 1/4.$$

Задача S-10.7.

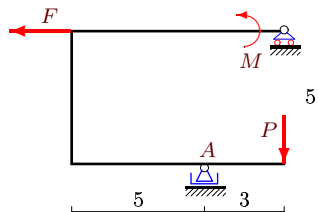
12



$$P = 9 \text{ кН}, M = 6 \text{ кНм}, f_{\text{ТР}} = 3/4.$$

Задача S-10.8.

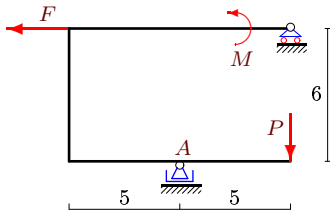
12



$$P = 1 \text{ кН}, M = 11 \text{ кНм}, f_{\text{ТР}} = 1/2.$$

Задача S-10.9.

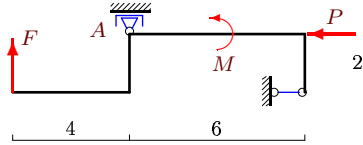
12



$P = 1 \text{ кН}, M = 48 \text{ кНМ}, f_{\text{ТР}} = 1/2.$

Задача S-10.10.

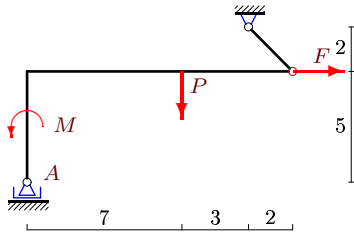
12



$P = 55 \text{ кН}, M = 55 \text{ кНМ}, f_{\text{ТР}} = 3/4.$

Задача S-10.11.

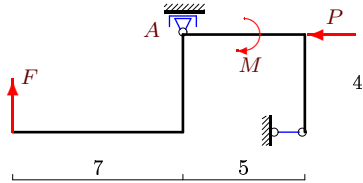
12



$P = 551 \text{ кН}, M = 551 \text{ кНМ}, f_{\text{ТР}} = 1/2.$

Задача S-10.12.

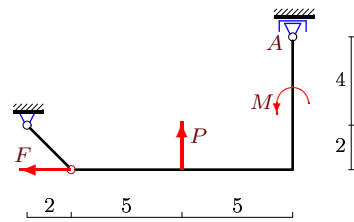
12



$P = 36 \text{ кН}, M = 132 \text{ кНМ}, f_{\text{ТР}} = 5/4.$

Задача S-10.13.

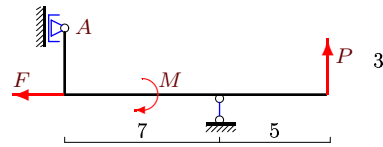
12



$P = 18 \text{ кН}, M = 36 \text{ кНМ}, f_{\text{ТР}} = 2/3.$

Задача S-10.14.

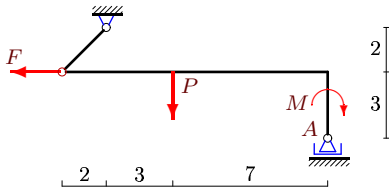
12



$P = 45 \text{ кН}, M = 49 \text{ кНМ}, f_{\text{ТР}} = 1/5.$

Задача S-10.15.

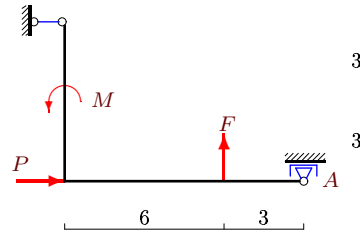
12



$P = 63 \text{ кН}, M = 63 \text{ кНМ}, f_{\text{ТР}} = 1/2.$

Задача S-10.16.

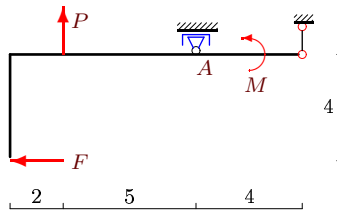
12



$P = 7 \text{ кН}, M = 198 \text{ кНМ}, f_{\text{ТР}} = 3/4.$

Задача S-10.17.

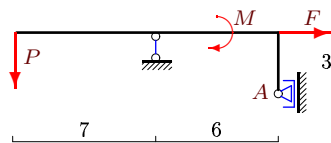
12



$P = 3 \text{ кН}, M = 15 \text{ кНМ}, f_{\text{ТР}} = 1/2.$

Задача S-10.18.

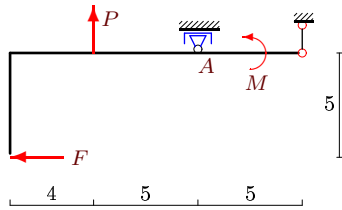
12



$P = 4 \text{ кН}, M = 1 \text{ кНМ}, f_{\text{ТР}} = 1/4.$

Задача S-10.19.

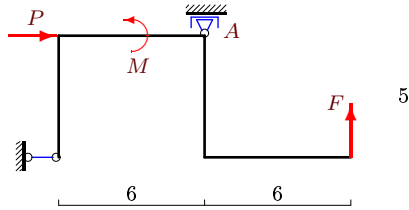
12



$P = 13 \text{ кН}, M = 5 \text{ кНм}, f_{\text{ТР}} = 2/3.$

Задача S-10.20.

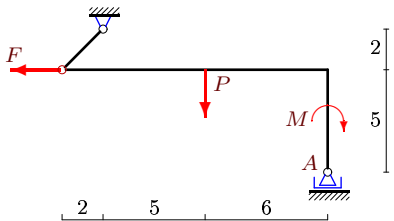
12



$P = 1053 \text{ кН}, M = 5031 \text{ кНм}, f_{\text{ТР}} = 3/4.$

Задача S-10.21.

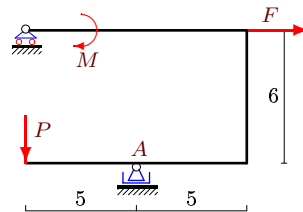
12



$P = 217 \text{ кН}, M = 217 \text{ кНм}, f_{\text{ТР}} = 1/2.$

Задача S-10.22.

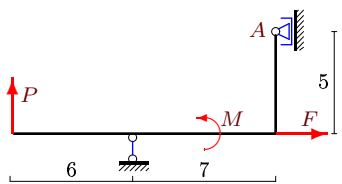
12



$P = 5 \text{ кН}, M = 162 \text{ кНм}, f_{\text{ТР}} = 2/3.$

Задача S-10.23.

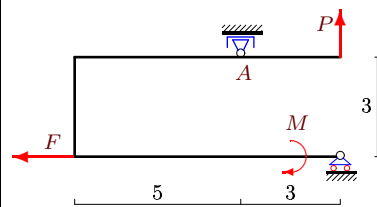
12



$P = 33 \text{ кН}, M = 22 \text{ кНм}, f_{\text{ТР}} = 1/3.$

Задача S-10.24.

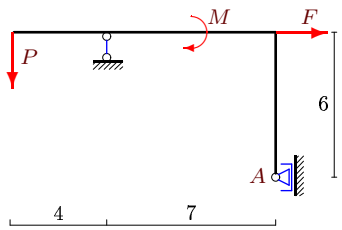
12



$P = 7 \text{ кН}, M = 36 \text{ кНм}, f_{\text{ТР}} = 1/2.$

Задача S-10.25.

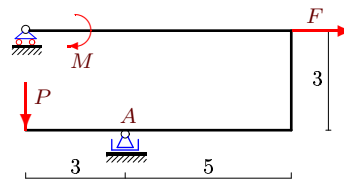
12



$P = 32 \text{ кН}, M = 33 \text{ кНм}, f_{\text{ТР}} = 1/2.$

Задача S-10.26.

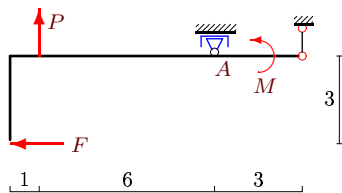
12



$P = 3 \text{ кН}, M = 60 \text{ кНм}, f_{\text{ТР}} = 2/3.$

Задача S-10.27.

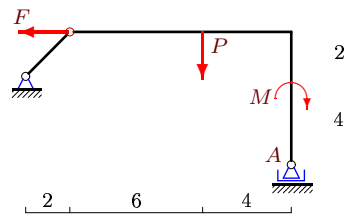
12



$P = 11 \text{ кН}, M = 54 \text{ кНм}, f_{\text{ТР}} = 2/3.$

Задача S-10.28.

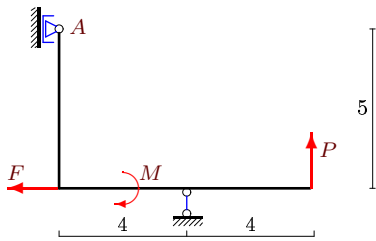
12



$P = 63 \text{ кН}, M = 126 \text{ кНм}, f_{\text{ТР}} = 2/3.$

Задача S-10.29.

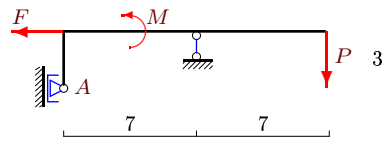
12



$P = 31 \text{ кН}, M = 40 \text{ кНМ}, f_{\text{ТР}} = 1/2.$

Задача S-10.30.

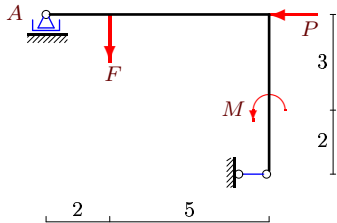
12



$P = 6 \text{ кН}, M = 26 \text{ кНМ}, f_{\text{ТР}} = 1/3.$

Задача S-10.31.

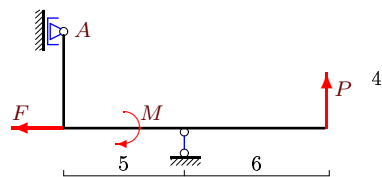
12



$P = 3 \text{ кН}, M = 49 \text{ кНМ}, f_{\text{ТР}} = 2/3.$

Задача S-10.32.

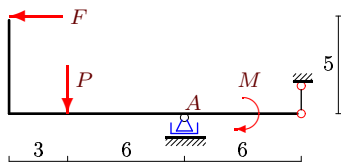
12



$P = 14 \text{ кН}, M = 45 \text{ кНМ}, f_{\text{ТР}} = 1/2.$

Задача S-10.33.

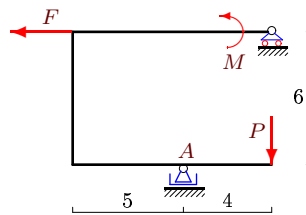
12



$P = 37 \text{ кН}, M = 93 \text{ кНМ}, f_{\text{ТР}} = 3/4.$

Задача S-10.34.

12



$P = 1 \text{ кН}, M = 28 \text{ кНМ}, f_{\text{ТР}} = 1/2.$

S-10

**Ответы.**  
**Равновесие рамы с трением**

04.10.2014

№	$F$
1	$-60 < F < 420$ кН
2	$-6 < F < 18$ кН
3	$-13 < F < 27$ кН
4	$F > 20$ кН
5	$48 < F < 208$ кН
6	$48 < F < 80$ кН
7	$F > 8$ кН
8	$-1 < F < 11$ кН
9	$-3 < F < 12$ кН
10	$30 < F < 66$ кН
11	$29 < F < 437$ кН
12	$1 < F < 6$ кН
13	$-17 < F < 15$ кН
14	$40 < F < 110$ кН
15	$9 < F < 49$ кН
16	$F > 32$ кН
17	$-1 < F < 3$ кН
18	$6 < F < 18$ кН
19	$-10 < F < 50$ кН
20	$24 < F < 104$ кН
21	$-31 < F < 161$ кН
22	$-12 < F < 108$ кН
23	$24 < F < 66$ кН
24	$-4 < F < 12$ кН
25	$10 < F < 38$ кН
26	$-8 < F < 40$ кН
27	$-6 < F < 30$ кН
28	$-77 < F < 51$ кН
29	$12 < F < 28$ кН
30	$3 < F < 24$ кН
31	$F > 12$ кН
32	$6 < F < 26$ кН
33	$-27 < F < 117$ кН
34	$-2 < F < 14$ кН

*S-10* файл о10s12A