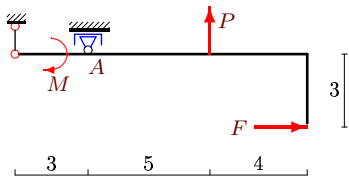


# Равновесие рамы с трением

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.**

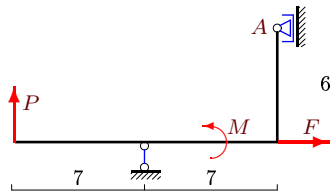
11



$$P = 4 \text{ кН}, M = 11 \text{ кНм}, f_{\text{ТР}} = 3/4.$$

**Задача S-10.2.**

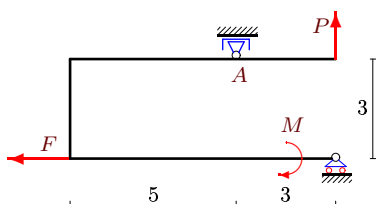
11



$$P = 82 \text{ кН}, M = 47 \text{ кНм}, f_{\text{ТР}} = 1/4.$$

**Задача S-10.3.**

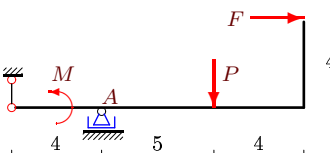
11



$$P = 17 \text{ кН}, M = 108 \text{ кНм}, f_{\text{ТР}} = 1/2.$$

**Задача S-10.4.**

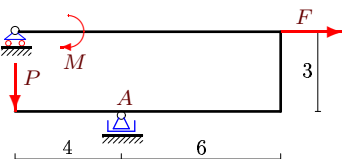
11



$$P = 17 \text{ кН}, M = 41 \text{ кНм}, f_{\text{ТР}} = 3/4.$$

**Задача S-10.5.**

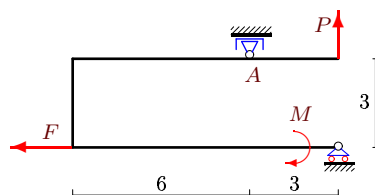
11



$$P = 31 \text{ кН}, M = 700 \text{ кНм}, f_{\text{ТР}} = 3/4.$$

**Задача S-10.6.**

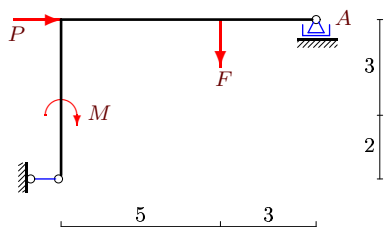
11



$$P = 7 \text{ кН}, M = 45 \text{ кНм}, f_{\text{ТР}} = 2/3.$$

**Задача S-10.7.**

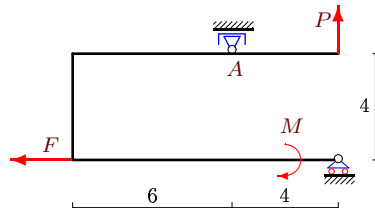
11



$$P = 7 \text{ кН}, M = 19 \text{ кНм}, f_{\text{ТР}} = 3/4.$$

**Задача S-10.8.**

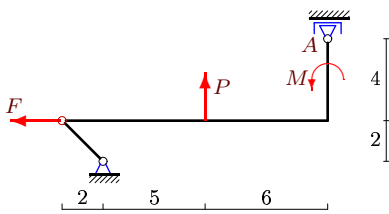
11



$$P = 11 \text{ кН}, M = 200 \text{ кНм}, f_{\text{ТР}} = 2/3.$$

Задача S-10.9.

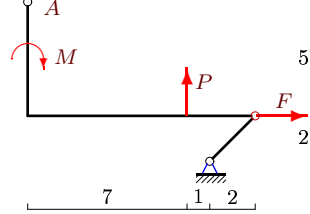
11



$P = 165 \text{ кН}, M = 165 \text{ кНМ}, f_{\text{ТР}} = 1/2.$

Задача S-10.10.

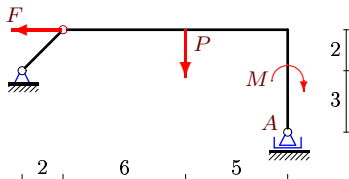
11



$P = 10 \text{ кН}, M = 10 \text{ кНМ}, f_{\text{ТР}} = 2/3.$

Задача S-10.11.

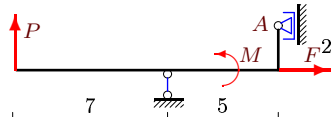
11



$P = 459 \text{ кН}, M = 918 \text{ кНМ}, f_{\text{ТР}} = 1/2.$

Задача S-10.12.

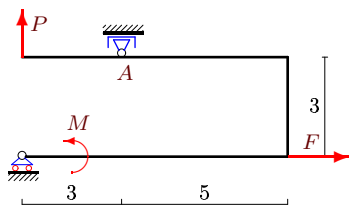
11



$P = 22 \text{ кН}, M = 35 \text{ кНМ}, f_{\text{ТР}} = 1/6.$

Задача S-10.13.

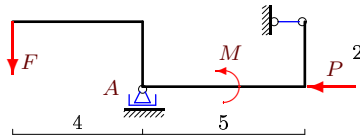
11



$P = 13 \text{ кН}, M = 135 \text{ кНМ}, f_{\text{ТР}} = 2/3.$

Задача S-10.14.

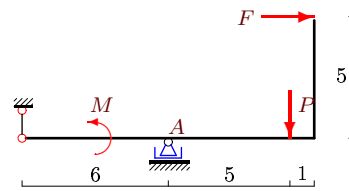
11



$P = 156 \text{ кН}, M = 117 \text{ кНМ}, f_{\text{ТР}} = 5/4.$

Задача S-10.15.

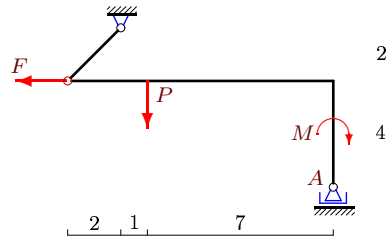
11



$P = 4 \text{ кН}, M = 5 \text{ кНМ}, f_{\text{ТР}} = 3/4.$

Задача S-10.16.

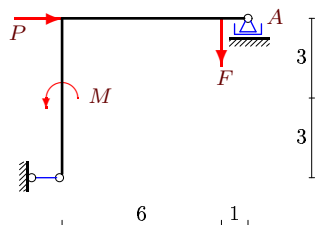
11



$P = 209 \text{ кН}, M = 209 \text{ кНМ}, f_{\text{ТР}} = 2/3.$

Задача S-10.17.

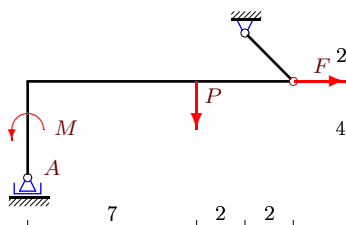
11



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

Задача S-10.18.

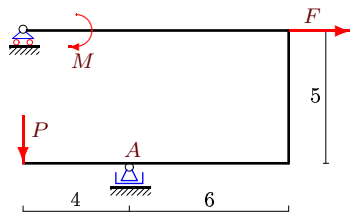
11



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

**Задача S-10.19.**

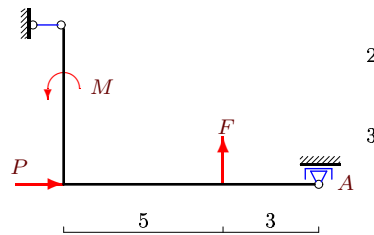
11



$P = 5 \text{ кН}, M = 176 \text{ кНМ}, f_{\text{ТР}} = 2/3.$

**Задача S-10.20.**

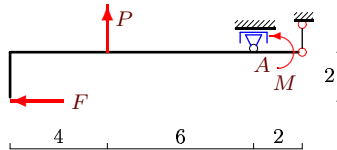
11



$P = 1 \text{ кН}, M = 22 \text{ кНМ}, f_{\text{ТР}} = 3/4.$

**Задача S-10.21.**

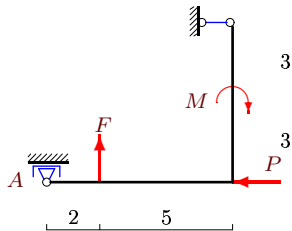
11



$P = 3 \text{ кН}, M = 14 \text{ кНМ}, f_{\text{ТР}} = 2/3.$

**Задача S-10.22.**

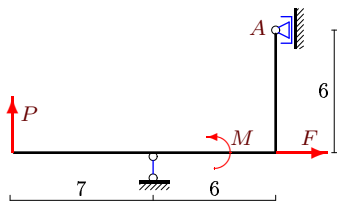
11



$P = 1 \text{ кН}, M = 48 \text{ кНМ}, f_{\text{ТР}} = 2/3.$

**Задача S-10.23.**

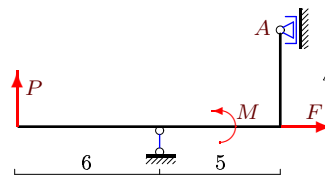
11



$P = 7 \text{ кН}, M = 4 \text{ кНМ}, f_{\text{ТР}} = 1/4.$

**Задача S-10.24.**

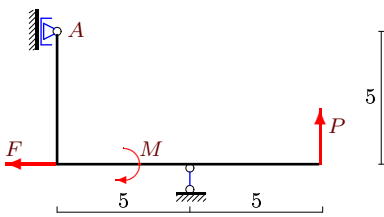
11



$P = 47 \text{ кН}, M = 51 \text{ кНМ}, f_{\text{ТР}} = 1/4.$

**Задача S-10.25.**

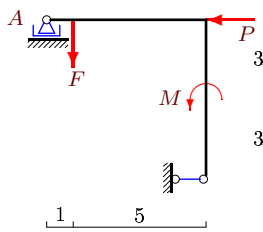
11



$P = 19 \text{ кН}, M = 20 \text{ кНМ}, f_{\text{ТР}} = 1/2.$

**Задача S-10.26.**

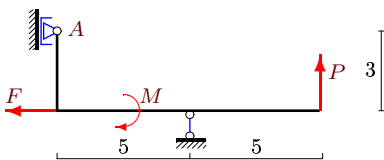
11



$P = 5 \text{ кН}, M = 34 \text{ кНМ}, f_{\text{ТР}} = 1/2.$

**Задача S-10.27.**

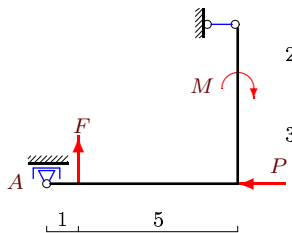
11



$P = 41 \text{ кН}, M = 5 \text{ кНМ}, f_{\text{ТР}} = 1/5.$

**Задача S-10.28.**

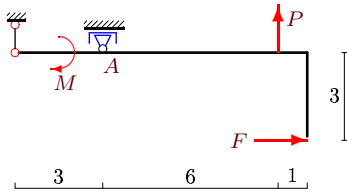
11



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

Задача S-10.29.

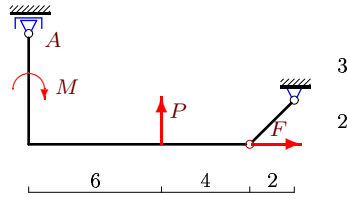
11



$P = 13 \text{ кН}, M = 54 \text{ кНм}, f_{\text{ТР}} = 3/4.$

Задача S-10.30.

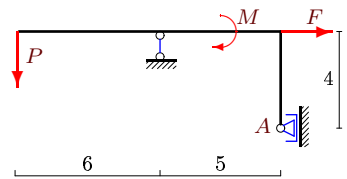
11



$P = 20 \text{ кН}, M = 40 \text{ кНм}, f_{\text{ТР}} = 2/3.$

Задача S-10.31.

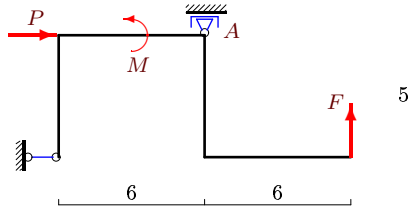
11



$P = 21 \text{ кН}, M = 7 \text{ кНм}, f_{\text{ТР}} = 1/3.$

Задача S-10.32.

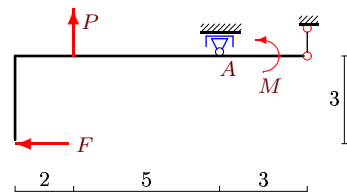
11



$P = 468 \text{ кН}, M = 1755 \text{ кНм}, f_{\text{ТР}} = 3/4.$

Задача S-10.33.

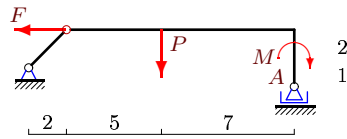
11



$P = 3 \text{ кН}, M = 9 \text{ кНм}, f_{\text{ТР}} = 2/3.$

Задача S-10.34.

11



$P = 27 \text{ кН}, M = 54 \text{ кНм}, f_{\text{ТР}} = 1/2.$

S-10

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

04.10.2014

№	$F$
1	$-3 < F < 21$ кН
2	$68 < F < 124$ кН
3	$-12 < F < 36$ кН
4	$-12 < F < 84$ кН
5	$-84 < F < 300$ кН
6	$-6 < F < 30$ кН
7	$F > 8$ кН
8	$-20 < F < 100$ кН
9	$-15 < F < 121$ кН
10	$0 < F < 9$ кН
11	$-189 < F < 323$ кН
12	$42 < F < 102$ кН
13	$-18 < F < 90$ кН
14	$30 < F < 130$ кН
15	$-3 < F < 13$ кН
16	$19 < F < 187$ кН
17	$F > 4$ кН
18	$13 < F < 63$ кН
19	$-16 < F < 176$ кН
20	$F > 4$ кН
21	$-2 < F < 10$ кН
22	$F > 9$ кН
23	$6 < F < 10$ кН
24	$44 < F < 84$ кН
25	$10 < F < 30$ кН
26	$F > 16$ кН
27	$50 < F < 100$ кН
28	$F > 6$ кН
29	$-9 < F < 63$ кН
30	$-10 < F < 17$ кН
31	$21 < F < 51$ кН
32	$60 < F < 260$ кН
33	$-2 < F < 10$ кН
34	$0 < F < 20$ кН

*S-10* файл о10s11A