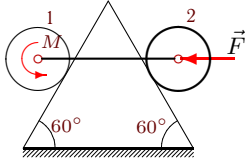
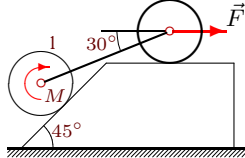
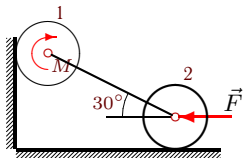
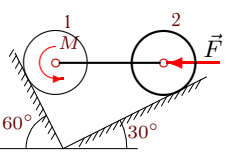
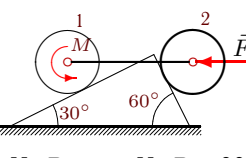
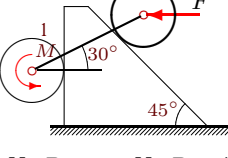
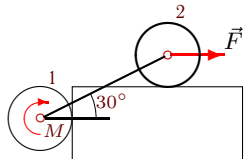
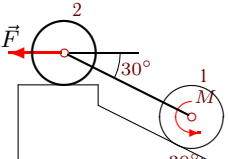
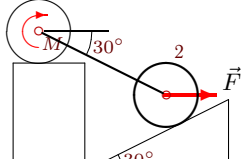
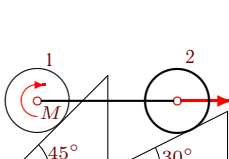


Трение качения

Система состоит из двух цилиндров весом G_1 и G_2 с одинаковыми радиусами R , соединенных однородным стержнем весом G_3 . Цилиндры могут кататься без проскальзывания, цилиндр 1 без сопротивления, а цилиндр 2 с трением качения (δ). В каких пределах меняется внешний момент M при условии равновесия системы?

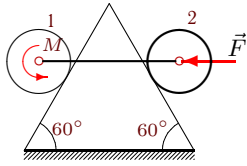
В ответах даны нормальные реакции опор и момент M для движения цилиндра 2 по часовой стрелке и против (последние три столбца).

Кирсанов М.Н. Решебник. Теоретическая механика с. 80.

<p>Вариант 1 С18.</p>  <p>$P_1 = 10 \text{ Н}, P_2 = 23 \text{ Н}, P_3 = 30 \text{ Н},$ $F = 5 \text{ Н}, R = 35 \text{ см}, \delta = 3 \text{ мм}.$</p>	<p>Вариант 2 С18.</p>  <p>$P_1 = 22 \text{ Н}, P_2 = 23 \text{ Н}, P_3 = 50 \text{ Н},$ $F = 10 \text{ Н}, R = 50 \text{ см}, \delta = 4 \text{ мм}.$</p>
<p>Вариант 3 С18.</p>  <p>$P_1 = 5 \text{ Н}, P_2 = 25 \text{ Н}, P_3 = 10 \text{ Н},$ $F = 30 \text{ Н}, R = 65 \text{ см}, \delta = 5 \text{ мм}.$</p>	<p>Вариант 4 С18.</p>  <p>$P_1 = 24 \text{ Н}, P_2 = 27 \text{ Н}, P_3 = 20 \text{ Н},$ $F = 20 \text{ Н}, R = 50 \text{ см}, \delta = 3 \text{ мм}.$</p>
<p>Вариант 5 С18.</p>  <p>$P_1 = 25 \text{ Н}, P_2 = 29 \text{ Н}, P_3 = 30 \text{ Н},$ $F = 25 \text{ Н}, R = 35 \text{ см}, \delta = 1 \text{ мм}.$</p>	<p>Вариант 6 С18.</p>  <p>$P_1 = 21 \text{ Н}, P_2 = 26 \text{ Н}, P_3 = 40 \text{ Н},$ $F = 5 \text{ Н}, R = 25 \text{ см}, \delta = 2 \text{ мм}.$</p>
<p>Вариант 7 С18.</p>  <p>$P_1 = 22 \text{ Н}, P_2 = 24 \text{ Н}, P_3 = 50 \text{ Н},$ $F = 10 \text{ Н}, R = 40 \text{ см}, \delta = 3 \text{ мм}.$</p>	<p>Вариант 8 С18.</p>  <p>$P_1 = 23 \text{ Н}, P_2 = 24 \text{ Н}, P_3 = 30 \text{ Н},$ $F = 15 \text{ Н}, R = 55 \text{ см}, \delta = 4 \text{ мм}.$</p>
<p>Вариант 9 С18.</p>  <p>$P_1 = 24 \text{ Н}, P_2 = 26 \text{ Н}, P_3 = 50 \text{ Н},$ $F = 20 \text{ Н}, R = 70 \text{ см}, \delta = 5 \text{ мм}.$</p>	<p>Вариант 10 С18.</p>  <p>$P_1 = 25 \text{ Н}, P_2 = 28 \text{ Н}, P_3 = 10 \text{ Н},$ $F = 25 \text{ Н}, R = 35 \text{ см}, \delta = 1 \text{ мм}.$</p>

Вариант 11

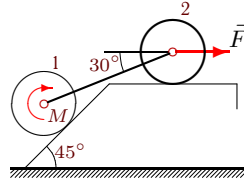
С18.



$P_1 = 11 \text{ H}, P_2 = 26 \text{ H}, P_3 = 20 \text{ H},$
 $F = 10 \text{ H}, R = 30 \text{ см}, \delta = 2 \text{ мм}.$

Вариант 12

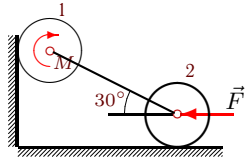
С18.



$P_1 = 23 \text{ H}, P_2 = 28 \text{ H}, P_3 = 30 \text{ H},$
 $F = 15 \text{ H}, R = 45 \text{ см}, \delta = 3 \text{ мм}.$

Вариант 13

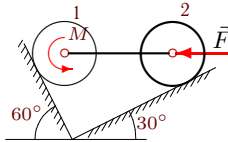
С18.



$P_1 = 6 \text{ H}, P_2 = 25 \text{ H}, P_3 = 40 \text{ H},$
 $F = 40 \text{ H}, R = 60 \text{ см}, \delta = 4 \text{ мм}.$

Вариант 14

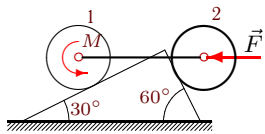
С18.



$P_1 = 25 \text{ H}, P_2 = 27 \text{ H}, P_3 = 50 \text{ H},$
 $F = 25 \text{ H}, R = 75 \text{ см}, \delta = 5 \text{ мм}.$

Вариант 15

С18.



$P_1 = 21 \text{ H}, P_2 = 24 \text{ H}, P_3 = 10 \text{ H},$
 $F = 5 \text{ H}, R = 15 \text{ см}, \delta = 1 \text{ мм}.$

Вариант 16

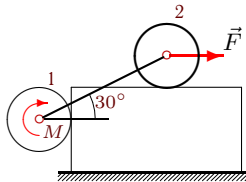
С18.



$P_1 = 22 \text{ H}, P_2 = 26 \text{ H}, P_3 = 20 \text{ H},$
 $F = 10 \text{ H}, R = 30 \text{ см}, \delta = 2 \text{ мм}.$

Вариант 17

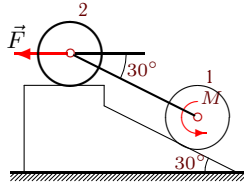
С18.



$P_1 = 23 \text{ H}, P_2 = 28 \text{ H}, P_3 = 30 \text{ H},$
 $F = 15 \text{ H}, R = 45 \text{ см}, \delta = 3 \text{ мм}.$

Вариант 18

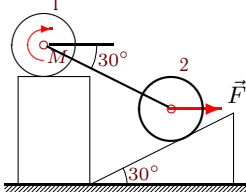
С18.



$P_1 = 24 \text{ H}, P_2 = 25 \text{ H}, P_3 = 40 \text{ H},$
 $F = 20 \text{ H}, R = 60 \text{ см}, \delta = 4 \text{ мм}.$

Вариант 19

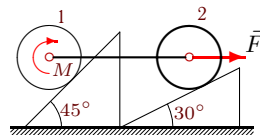
С18.



$P_1 = 25 \text{ H}, P_2 = 27 \text{ H}, P_3 = 50 \text{ H},$
 $F = 25 \text{ H}, R = 75 \text{ см}, \delta = 5 \text{ мм}.$

Вариант 20

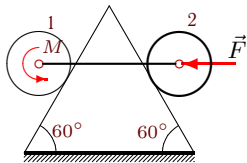
С18.



$P_1 = 21 \text{ H}, P_2 = 24 \text{ H}, P_3 = 10 \text{ H},$
 $F = 5 \text{ H}, R = 15 \text{ см}, \delta = 1 \text{ мм}.$

Вариант 21

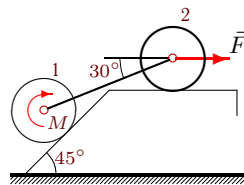
С18.



$P_1 = 11 \text{ H}, P_2 = 27 \text{ H}, P_3 = 20 \text{ H},$
 $F = 15 \text{ H}, R = 35 \text{ см}, \delta = 2 \text{ мм}.$

Вариант 22

С18.



$P_1 = 24 \text{ H}, P_2 = 29 \text{ H}, P_3 = 30 \text{ H},$
 $F = 20 \text{ H}, R = 50 \text{ см}, \delta = 3 \text{ мм}.$

Вариант 23
C18.

$P_1 = 6 \text{ H}, P_2 = 26 \text{ H}, P_3 = 40 \text{ H},$
 $F = 50 \text{ H}, R = 65 \text{ см}, \delta = 4 \text{ мм}.$

Вариант 24
C18.

$P_1 = 21 \text{ H}, P_2 = 23 \text{ H}, P_3 = 50 \text{ H},$
 $F = 5 \text{ H}, R = 55 \text{ см}, \delta = 5 \text{ мм}.$

Вариант 25
C18.

$P_1 = 22 \text{ H}, P_2 = 25 \text{ H}, P_3 = 10 \text{ H},$
 $F = 10 \text{ H}, R = 20 \text{ см}, \delta = 1 \text{ мм}.$

Вариант 26
C18.

$P_1 = 23 \text{ H}, P_2 = 27 \text{ H}, P_3 = 20 \text{ H},$
 $F = 15 \text{ H}, R = 35 \text{ см}, \delta = 2 \text{ мм}.$

Вариант 27
C18.

$P_1 = 24 \text{ H}, P_2 = 29 \text{ H}, P_3 = 30 \text{ H},$
 $F = 20 \text{ H}, R = 50 \text{ см}, \delta = 3 \text{ мм}.$

Вариант 28
C18.

$P_1 = 25 \text{ H}, P_2 = 26 \text{ H}, P_3 = 40 \text{ H},$
 $F = 25 \text{ H}, R = 65 \text{ см}, \delta = 4 \text{ мм}.$

Вариант 29
C18.

$P_1 = 21 \text{ H}, P_2 = 23 \text{ H}, P_3 = 50 \text{ H},$
 $F = 5 \text{ H}, R = 55 \text{ см}, \delta = 5 \text{ мм}.$

Вариант 30
C18.

$P_1 = 22 \text{ H}, P_2 = 25 \text{ H}, P_3 = 10 \text{ H},$
 $F = 10 \text{ H}, R = 20 \text{ см}, \delta = 1 \text{ мм}.$

Ответы

	N_1	N_2	M	N_1	N_2	M
	H		Hm	H		Hm
1	64.058	74.888	2.841	66.315	77.145	3.297
2	36.095	53.526	11.279	36.352	54.023	10.799
3	30.366	47.532	4.896	29.638	47.111	4.622
4	53.078	42.872	4.308	52.565	42.576	4.456
5	59.996	87.567	8.371	60.499	88.438	8.675
6	93.257	140.078	3.211	100.988	148.699	4.326
7	9.591	54.537	16.585	10.413	55.012	16.395
8	32.909	47.861	0.703	32.909	47.461	1.143
9	40.326	69.191	10.516	41.303	67.500	9.333
10	25.330	38.168	5.984	25.507	38.042	5.922
11	55.018	71.178	2.255	56.681	72.841	2.543
12	31.250	51.462	4.735	31.456	51.860	4.389
13	40.456	68.357	-1.586	39.548	67.833	-1.900
14	73.052	60.276	11.669	72.252	59.814	12.015
15	44.749	57.338	3.826	45.523	58.678	4.027
16	59.315	98.685	0.674	63.830	103.720	1.456
17	14.657	51.462	13.292	15.346	51.860	13.113
18	38.105	56.765	-0.919	38.105	56.330	-0.396
19	45.212	65.827	6.220	46.079	64.324	5.093
20	9.898	33.616	4.031	10.263	33.358	3.976
21	52.284	73.275	2.078	53.749	74.740	2.374
22	33.455	55.355	2.820	33.654	55.740	2.449
23	50.462	75.134	2.037	49.541	74.602	1.692
24	51.837	55.718	12.754	50.829	55.136	13.074
25	44.066	59.485	4.465	44.666	60.524	4.673
26	50.277	92.847	-1.390	53.905	96.893	-0.657
27	19.668	55.355	13.822	20.334	55.740	13.630
28	38.971	60.649	-4.419	38.971	60.220	-3.861
29	25.608	79.388	19.426	27.029	76.927	18.072
30	13.774	34.741	4.882	14.057	34.541	4.825