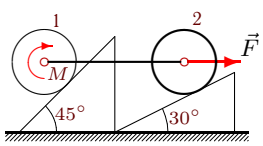
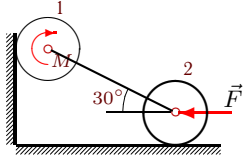
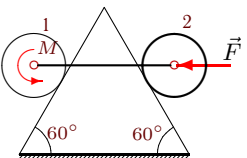
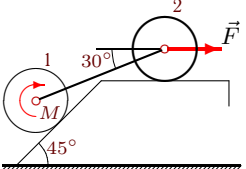
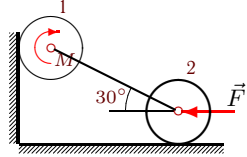
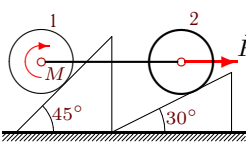
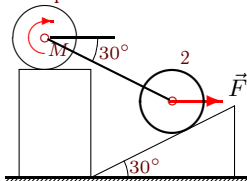
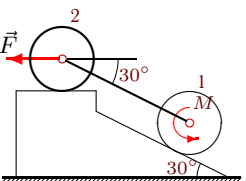
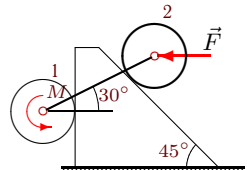
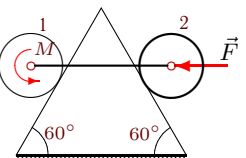


Трение качения

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?

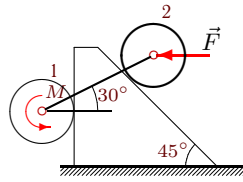
В ответах даны нормальные реакции опор и момент M для движения цилиндра 2 по часовой стрелке и против (последние три столбца).

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

<p>Вариант 1 С18.</p>  <p>$P_1 = 24 \text{ Н}, P_2 = 26 \text{ Н}, P_3 = 20 \text{ Н},$ $F = 20 \text{ Н}, R = 70 \text{ см}, \delta = 5 \text{ мм}.$</p>	<p>Вариант 2 С18.</p>  <p>$P_1 = 5 \text{ Н}, P_2 = 23 \text{ Н}, P_3 = 30 \text{ Н},$ $F = 10 \text{ Н}, R = 45 \text{ см}, \delta = 4 \text{ мм}.$</p>
<p>Вариант 3 С18.</p>  <p>$P_1 = 12 \text{ Н}, P_2 = 27 \text{ Н}, P_3 = 50 \text{ Н},$ $F = 20 \text{ Н}, R = 50 \text{ см}, \delta = 3 \text{ мм}.$</p>	<p>Вариант 4 С18.</p>  <p>$P_1 = 21 \text{ Н}, P_2 = 25 \text{ Н}, P_3 = 40 \text{ Н},$ $F = 5 \text{ Н}, R = 35 \text{ см}, \delta = 3 \text{ мм}.$</p>
<p>Вариант 5 С18.</p>  <p>$P_1 = 5 \text{ Н}, P_2 = 24 \text{ Н}, P_3 = 30 \text{ Н},$ $F = 10 \text{ Н}, R = 45 \text{ см}, \delta = 4 \text{ мм}.$</p>	<p>Вариант 6 С18.</p>  <p>$P_1 = 22 \text{ Н}, P_2 = 26 \text{ Н}, P_3 = 40 \text{ Н},$ $F = 10 \text{ Н}, R = 30 \text{ см}, \delta = 2 \text{ мм}.$</p>
<p>Вариант 7 С18.</p>  <p>$P_1 = 23 \text{ Н}, P_2 = 24 \text{ Н}, P_3 = 40 \text{ Н},$ $F = 15 \text{ Н}, R = 35 \text{ см}, \delta = 2 \text{ мм}.$</p>	<p>Вариант 8 С18.</p>  <p>$P_1 = 21 \text{ Н}, P_2 = 23 \text{ Н}, P_3 = 30 \text{ Н},$ $F = 5 \text{ Н}, R = 45 \text{ см}, \delta = 4 \text{ мм}.$</p>
<p>Вариант 9 С18.</p>  <p>$P_1 = 22 \text{ Н}, P_2 = 23 \text{ Н}, P_3 = 40 \text{ Н},$ $F = 10 \text{ Н}, R = 30 \text{ см}, \delta = 2 \text{ мм}.$</p>	<p>Вариант 10 С18.</p>  <p>$P_1 = 11 \text{ Н}, P_2 = 24 \text{ Н}, P_3 = 40 \text{ Н},$ $F = 10 \text{ Н}, R = 40 \text{ см}, \delta = 3 \text{ мм}.$</p>

Вариант 11

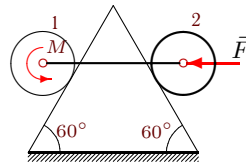
C18.



$P_1 = 23 \text{ H}, P_2 = 24 \text{ H}, P_3 = 30 \text{ H},$
 $F = 15 \text{ H}, R = 45 \text{ см}, \delta = 3 \text{ мм.}$

Вариант 12

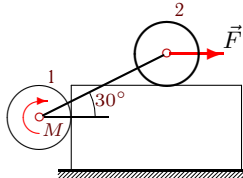
C18.



$P_1 = 12 \text{ H}, P_2 = 30 \text{ H}, P_3 = 10 \text{ H},$
 $F = 25 \text{ H}, R = 55 \text{ см}, \delta = 3 \text{ мм.}$

Вариант 13

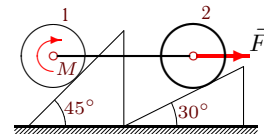
C18.



$P_1 = 21 \text{ H}, P_2 = 26 \text{ H}, P_3 = 30 \text{ H},$
 $F = 5 \text{ H}, R = 45 \text{ см}, \delta = 4 \text{ мм.}$

Вариант 14

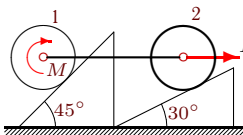
C18.



$P_1 = 21 \text{ H}, P_2 = 26 \text{ H}, P_3 = 10 \text{ H},$
 $F = 5 \text{ H}, R = 35 \text{ см}, \delta = 3 \text{ мм.}$

Вариант 15

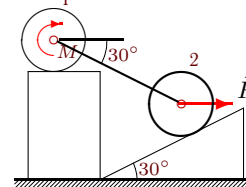
C18.



$P_1 = 22 \text{ H}, P_2 = 23 \text{ H}, P_3 = 20 \text{ H},$
 $F = 10 \text{ H}, R = 40 \text{ см}, \delta = 3 \text{ мм.}$

Вариант 16

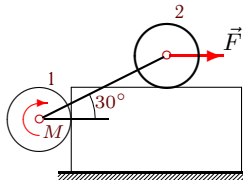
C18.



$P_1 = 24 \text{ H}, P_2 = 26 \text{ H}, P_3 = 10 \text{ H},$
 $F = 20 \text{ H}, R = 30 \text{ см}, \delta = 1 \text{ мм.}$

Вариант 17

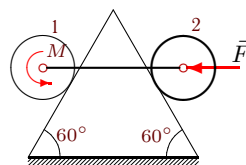
C18.



$P_1 = 25 \text{ H}, P_2 = 28 \text{ H}, P_3 = 20 \text{ H},$
 $F = 25 \text{ H}, R = 35 \text{ см}, \delta = 1 \text{ мм.}$

Вариант 18

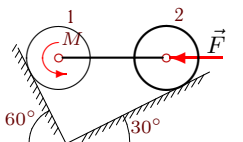
C18.



$P_1 = 12 \text{ H}, P_2 = 26 \text{ H}, P_3 = 20 \text{ H},$
 $F = 20 \text{ H}, R = 30 \text{ см}, \delta = 1 \text{ мм.}$

Вариант 19

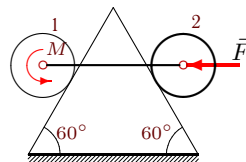
C18.



$P_1 = 24 \text{ H}, P_2 = 28 \text{ H}, P_3 = 10 \text{ H},$
 $F = 20 \text{ H}, R = 60 \text{ см}, \delta = 4 \text{ мм.}$

Вариант 20

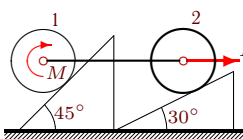
C18.



$P_1 = 12 \text{ H}, P_2 = 28 \text{ H}, P_3 = 20 \text{ H},$
 $F = 20 \text{ H}, R = 60 \text{ см}, \delta = 4 \text{ мм.}$

Вариант 21

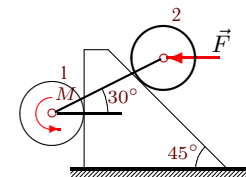
C18.



$P_1 = 23 \text{ H}, P_2 = 25 \text{ H}, P_3 = 30 \text{ H},$
 $F = 15 \text{ H}, R = 65 \text{ см}, \delta = 5 \text{ мм.}$

Вариант 22

C18.



$P_1 = 25 \text{ H}, P_2 = 27 \text{ H}, P_3 = 10 \text{ H},$
 $F = 25 \text{ H}, R = 35 \text{ см}, \delta = 1 \text{ мм.}$

Вариант 23
C18.

$P_1 = 12 \text{ H}, P_2 = 27 \text{ H}, P_3 = 20 \text{ H},$
 $F = 25 \text{ H}, R = 35 \text{ см}, \delta = 1 \text{ мм}.$

Вариант 24
C18.

$P_1 = 5 \text{ H}, P_2 = 24 \text{ H}, P_3 = 40 \text{ H},$
 $F = 20 \text{ H}, R = 40 \text{ см}, \delta = 3 \text{ мм}.$

Вариант 25
C18.

$P_1 = 23 \text{ H}, P_2 = 28 \text{ H}, P_3 = 40 \text{ H},$
 $F = 15 \text{ H}, R = 45 \text{ см}, \delta = 3 \text{ мм}.$

Вариант 26
C18.

$P_1 = 23 \text{ H}, P_2 = 24 \text{ H}, P_3 = 50 \text{ H},$
 $F = 15 \text{ H}, R = 55 \text{ см}, \delta = 4 \text{ мм}.$

Вариант 27
C18.

$P_1 = 22 \text{ H}, P_2 = 23 \text{ H}, P_3 = 20 \text{ H},$
 $F = 10 \text{ H}, R = 20 \text{ см}, \delta = 1 \text{ мм}.$

Вариант 28
C18.

$P_1 = 23 \text{ H}, P_2 = 28 \text{ H}, P_3 = 40 \text{ H},$
 $F = 15 \text{ H}, R = 65 \text{ см}, \delta = 5 \text{ мм}.$

Вариант 29
C18.

$P_1 = 25 \text{ H}, P_2 = 27 \text{ H}, P_3 = 40 \text{ H},$
 $F = 25 \text{ H}, R = 65 \text{ см}, \delta = 4 \text{ мм}.$

Вариант 30
C18.

$P_1 = 25 \text{ H}, P_2 = 30 \text{ H}, P_3 = 30 \text{ H},$
 $F = 25 \text{ H}, R = 45 \text{ см}, \delta = 2 \text{ мм}.$

Ответы

	N_1	N_2	M	N_1	N_2	M
	H		Hm	H		Hm
1	23.243	41.741	17.388	23.728	41.398	17.048
2	10.391	43.999	-6.300	9.613	43.550	-6.502
3	78.110	102.930	1.186	80.272	105.092	1.810
4	30.364	47.651	8.355	30.609	48.125	8.034
5	10.400	45.004	-6.298	9.604	44.545	-6.505
6	17.700	53.321	12.509	18.278	52.913	12.336
7	33.637	61.822	5.676	34.337	60.610	5.252
8	31.177	41.098	5.312	31.177	40.678	5.690
9	75.368	121.538	0.454	80.928	127.741	1.417
10	71.711	86.872	2.243	73.998	89.158	2.771
11	54.575	99.054	-2.921	59.107	104.109	-1.744
12	38.694	69.345	1.491	40.017	70.668	1.911
13	4.612	43.663	15.002	5.392	44.113	14.799
14	9.013	35.974	9.715	9.514	35.619	9.539
15	15.992	38.271	11.705	16.459	37.941	11.518
16	30.708	33.889	-0.887	30.932	33.500	-1.004
17	24.850	52.347	7.228	25.150	52.520	7.168
18	47.266	71.587	0.566	48.098	72.418	0.710
19	48.576	38.252	3.265	48.067	37.959	3.441
20	49.812	75.132	2.013	51.567	76.888	2.621
21	20.855	46.394	21.375	21.436	45.984	20.998
22	16.006	58.158	-7.266	17.130	59.411	-7.038
23	44.485	73.636	0.098	45.217	74.368	0.246
24	20.418	55.789	-5.285	19.585	55.308	-5.477
25	58.861	55.640	7.051	58.122	55.213	7.243
26	41.569	57.903	3.406	41.569	57.419	3.939
27	41.351	38.215	2.615	40.970	37.995	2.659
28	74.785	127.960	0.115	81.567	135.524	2.660
29	39.179	61.216	2.831	39.405	61.653	2.283
30	64.382	52.095	4.058	63.920	51.829	4.178