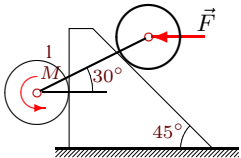
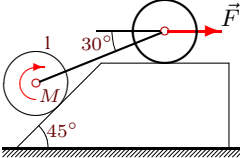
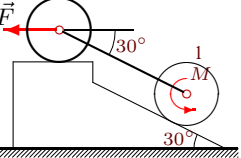
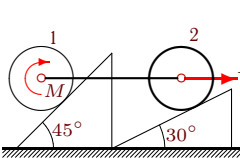
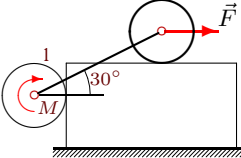
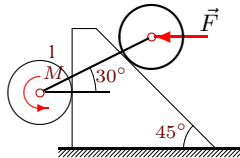
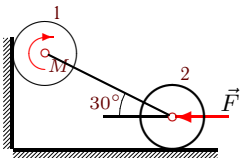
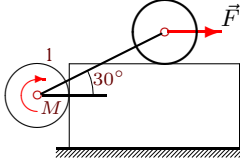
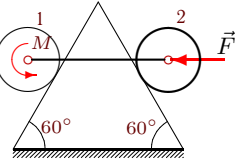
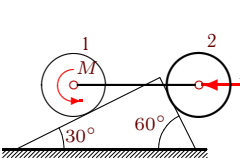


Трение качения

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?

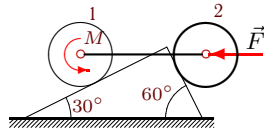
В ответах даны нормальные реакции опор и момент M для движения цилиндра 2 по часовой стрелке и против (последние три столбца).

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

<p>Вариант 1 С18.</p>  <p>$P_1 = 22 \text{ Н}, P_2 = 23 \text{ Н}, P_3 = 40 \text{ Н},$ $F = 10 \text{ Н}, R = 30 \text{ см}, \delta = 2 \text{ мм}.$</p>	<p>Вариант 2 С18.</p>  <p>$P_1 = 24 \text{ Н}, P_2 = 28 \text{ Н}, P_3 = 50 \text{ Н},$ $F = 20 \text{ Н}, R = 50 \text{ см}, \delta = 3 \text{ мм}.$</p>
<p>Вариант 3 С18.</p>  <p>$P_1 = 24 \text{ Н}, P_2 = 26 \text{ Н}, P_3 = 30 \text{ Н},$ $F = 20 \text{ Н}, R = 70 \text{ см}, \delta = 5 \text{ мм}.$</p>	<p>Вариант 4 С18.</p>  <p>$P_1 = 23 \text{ Н}, P_2 = 25 \text{ Н}, P_3 = 40 \text{ Н},$ $F = 15 \text{ Н}, R = 55 \text{ см}, \delta = 4 \text{ мм}.$</p>
<p>Вариант 5 С18.</p>  <p>$P_1 = 24 \text{ Н}, P_2 = 25 \text{ Н}, P_3 = 30 \text{ Н},$ $F = 20 \text{ Н}, R = 70 \text{ см}, \delta = 5 \text{ мм}.$</p>	<p>Вариант 6 С18.</p>  <p>$P_1 = 25 \text{ Н}, P_2 = 30 \text{ Н}, P_3 = 30 \text{ Н},$ $F = 25 \text{ Н}, R = 35 \text{ см}, \delta = 1 \text{ мм}.$</p>
<p>Вариант 7 С18.</p>  <p>$P_1 = 5 \text{ Н}, P_2 = 24 \text{ Н}, P_3 = 50 \text{ Н},$ $F = 10 \text{ Н}, R = 45 \text{ см}, \delta = 4 \text{ мм}.$</p>	<p>Вариант 8 С18.</p>  <p>$P_1 = 22 \text{ Н}, P_2 = 27 \text{ Н}, P_3 = 40 \text{ Н},$ $F = 10 \text{ Н}, R = 60 \text{ см}, \delta = 5 \text{ мм}.$</p>
<p>Вариант 9 С18.</p>  <p>$P_1 = 10 \text{ Н}, P_2 = 26 \text{ Н}, P_3 = 30 \text{ Н},$ $F = 5 \text{ Н}, R = 45 \text{ см}, \delta = 4 \text{ мм}.$</p>	<p>Вариант 10 С18.</p>  <p>$P_1 = 24 \text{ Н}, P_2 = 25 \text{ Н}, P_3 = 40 \text{ Н},$ $F = 20 \text{ Н}, R = 30 \text{ см}, \delta = 1 \text{ мм}.$</p>

Вариант 11

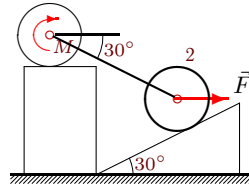
C18.



$P_1 = 22 \text{ H}, P_2 = 24 \text{ H}, P_3 = 10 \text{ H},$
 $F = 10 \text{ H}, R = 60 \text{ см}, \delta = 5 \text{ мм}.$

Вариант 12

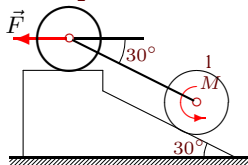
C18.



$P_1 = 21 \text{ H}, P_2 = 26 \text{ H}, P_3 = 50 \text{ H},$
 $F = 5 \text{ H}, R = 15 \text{ см}, \delta = 1 \text{ мм}.$

Вариант 13

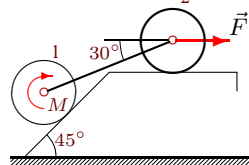
C18.



$P_1 = 22 \text{ H}, P_2 = 24 \text{ H}, P_3 = 30 \text{ H},$
 $F = 10 \text{ H}, R = 60 \text{ см}, \delta = 5 \text{ мм}.$

Вариант 14

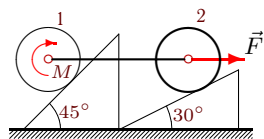
C18.



$P_1 = 23 \text{ H}, P_2 = 25 \text{ H}, P_3 = 20 \text{ H},$
 $F = 15 \text{ H}, R = 45 \text{ см}, \delta = 3 \text{ мм}.$

Вариант 15

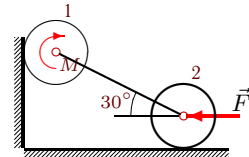
C18.



$P_1 = 23 \text{ H}, P_2 = 28 \text{ H}, P_3 = 30 \text{ H},$
 $F = 15 \text{ H}, R = 55 \text{ см}, \delta = 4 \text{ мм}.$

Вариант 16

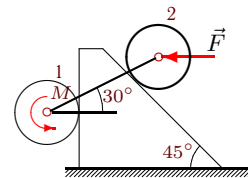
C18.



$P_1 = 6 \text{ H}, P_2 = 28 \text{ H}, P_3 = 40 \text{ H},$
 $F = 40 \text{ H}, R = 40 \text{ см}, \delta = 2 \text{ мм}.$

Вариант 17

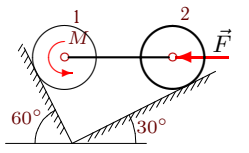
C18.



$P_1 = 24 \text{ H}, P_2 = 25 \text{ H}, P_3 = 50 \text{ H},$
 $F = 20 \text{ H}, R = 60 \text{ см}, \delta = 4 \text{ мм}.$

Вариант 18

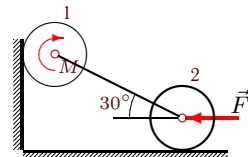
C18.



$P_1 = 23 \text{ H}, P_2 = 25 \text{ H}, P_3 = 50 \text{ H},$
 $F = 15 \text{ H}, R = 35 \text{ см}, \delta = 2 \text{ мм}.$

Вариант 19

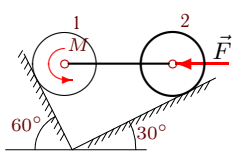
C18.



$P_1 = 6 \text{ H}, P_2 = 29 \text{ H}, P_3 = 30 \text{ H},$
 $F = 50 \text{ H}, R = 45 \text{ см}, \delta = 2 \text{ мм}.$

Вариант 20

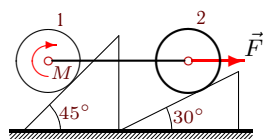
C18.



$P_1 = 22 \text{ H}, P_2 = 27 \text{ H}, P_3 = 40 \text{ H},$
 $F = 10 \text{ H}, R = 40 \text{ см}, \delta = 3 \text{ мм}.$

Вариант 21

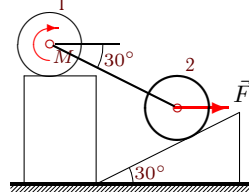
C18.



$P_1 = 22 \text{ H}, P_2 = 23 \text{ H}, P_3 = 50 \text{ H},$
 $F = 10 \text{ H}, R = 20 \text{ см}, \delta = 1 \text{ мм}.$

Вариант 22

C18.



$P_1 = 24 \text{ H}, P_2 = 26 \text{ H}, P_3 = 10 \text{ H},$
 $F = 20 \text{ H}, R = 70 \text{ см}, \delta = 5 \text{ мм}.$

Вариант 23
C18.

$P_1 = 21 \text{ H}, P_2 = 23 \text{ H}, P_3 = 20 \text{ H},$
 $F = 5 \text{ H}, R = 15 \text{ см}, \delta = 1 \text{ мм}.$

Вариант 24
C18.

$P_1 = 23 \text{ H}, P_2 = 28 \text{ H}, P_3 = 20 \text{ H},$
 $F = 15 \text{ H}, R = 45 \text{ см}, \delta = 3 \text{ мм}.$

Вариант 25
C18.

$P_1 = 22 \text{ H}, P_2 = 25 \text{ H}, P_3 = 50 \text{ H},$
 $F = 10 \text{ H}, R = 50 \text{ см}, \delta = 4 \text{ мм}.$

Вариант 26
C18.

$P_1 = 24 \text{ H}, P_2 = 28 \text{ H}, P_3 = 20 \text{ H},$
 $F = 20 \text{ H}, R = 50 \text{ см}, \delta = 3 \text{ мм}.$

Вариант 27
C18.

$P_1 = 25 \text{ H}, P_2 = 28 \text{ H}, P_3 = 40 \text{ H},$
 $F = 25 \text{ H}, R = 35 \text{ см}, \delta = 1 \text{ мм}.$

Вариант 28
C18.

$P_1 = 5 \text{ H}, P_2 = 26 \text{ H}, P_3 = 50 \text{ H},$
 $F = 30 \text{ H}, R = 45 \text{ см}, \delta = 3 \text{ мм}.$

Вариант 29
C18.

$P_1 = 24 \text{ H}, P_2 = 28 \text{ H}, P_3 = 50 \text{ H},$
 $F = 20 \text{ H}, R = 30 \text{ см}, \delta = 1 \text{ мм}.$

Вариант 30
C18.

$P_1 = 25 \text{ H}, P_2 = 29 \text{ H}, P_3 = 40 \text{ H},$
 $F = 25 \text{ H}, R = 45 \text{ см}, \delta = 2 \text{ мм}.$

Ответы

	N_1	N_2	M	N_1	N_2	M
	H		Hm	H		Hm
1	75.368	121.538	0.454	80.928	127.741	1.417
2	40.510	64.324	6.386	40.742	64.771	5.954
3	33.775	52.765	-2.820	33.775	52.331	-2.214
4	22.331	52.181	21.164	22.948	51.744	20.825
5	19.633	51.335	19.365	20.370	51.760	19.068
6	46.353	101.198	-4.633	48.309	103.379	-4.238
7	10.489	55.056	-10.775	9.516	54.494	-11.028
8	9.562	52.521	21.888	10.442	53.029	21.583
9	68.427	80.757	4.787	70.952	83.282	5.444
10	66.778	89.483	8.299	67.378	90.523	8.611
11	43.021	57.175	12.309	43.988	58.849	13.313
12	24.268	84.308	5.646	25.379	82.383	5.357
13	32.043	44.990	3.912	32.043	44.559	4.429
14	27.731	43.493	3.117	27.905	43.829	2.825
15	19.626	49.861	18.763	20.216	49.445	18.438
16	40.356	71.300	-1.080	39.646	70.889	-1.244
17	68.180	125.543	-5.782	73.924	131.949	-3.792
18	62.321	57.926	6.806	61.662	57.545	6.939
19	50.325	73.055	3.625	49.677	72.681	3.456
20	53.569	54.507	7.028	52.755	54.037	7.216
21	20.482	55.586	9.197	20.935	55.266	9.107
22	30.577	34.116	-1.912	31.058	33.282	-2.495
23	36.585	38.252	2.201	36.077	37.959	2.245
24	53.487	75.132	11.989	54.500	76.888	12.779
25	90.795	143.695	2.710	98.724	152.539	4.999
26	53.585	44.031	4.161	53.058	43.727	4.313
27	24.822	62.331	10.734	25.179	62.537	10.662
28	30.457	68.584	-5.587	29.546	68.059	-5.824
29	42.435	64.671	0.347	42.435	64.423	0.496
30	68.903	56.726	5.481	68.400	56.436	5.612