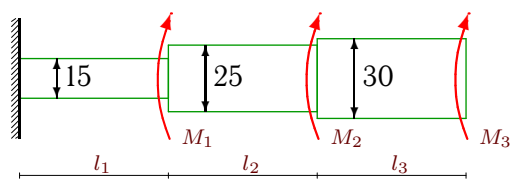


Кручение стержней кругового сечения

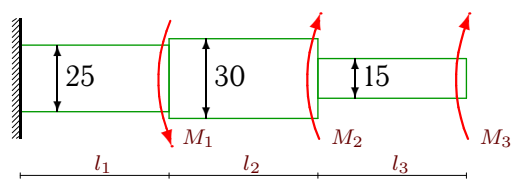
К стальному стержню кусочно-постоянного круглого сечения приложены моменты M_1, M_2, M_3 . Построить эпюры углов закручивания и касательных напряжений на поверхности вала. Модуль сдвига материала $G = 80 \text{ ГПа}$. Диаметры даны в сантиметрах.

Задача M28.1.



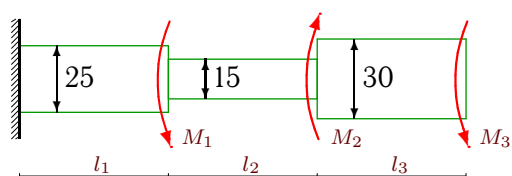
$M_1 = 6 \text{ кНм}, M_2 = 36 \text{ кНм}, M_3 = 6 \text{ кНм},$
 $l_1 = 2.8 \text{ м}, l_2 = 2.2 \text{ м}, l_3 = 2.8 \text{ м}.$

Задача M28.2.



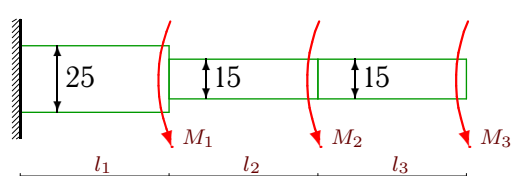
$M_1 = 7 \text{ кНм}, M_2 = 9 \text{ кНм}, M_3 = 9 \text{ кНм},$
 $l_1 = 3 \text{ м}, l_2 = 2.8 \text{ м}, l_3 = 2.8 \text{ м}.$

Задача M28.3.



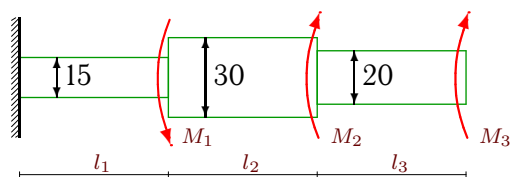
$M_1 = 18 \text{ кНм}, M_2 = 44 \text{ кНм}, M_3 = 13 \text{ кНм},$
 $l_1 = 3.6 \text{ м}, l_2 = 2.2 \text{ м}, l_3 = 3.2 \text{ м}.$

Задача M28.4.



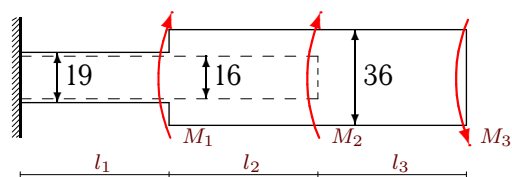
$M_1 = 14 \text{ кНм}, M_2 = 60 \text{ кНм}, M_3 = 45 \text{ кНм},$
 $l_1 = 3.2 \text{ м}, l_2 = 3.8 \text{ м}, l_3 = 4 \text{ м}.$

Задача M28.5.



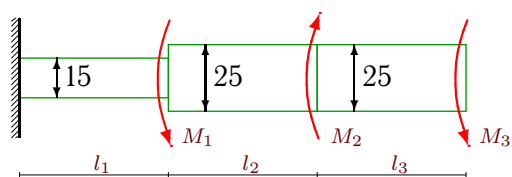
$M_1 = 24 \text{ кНм}, M_2 = 32 \text{ кНм}, M_3 = 22 \text{ кНм},$
 $l_1 = 3.8 \text{ м}, l_2 = 2.2 \text{ м}, l_3 = 2.6 \text{ м}.$

Задача M28.6.



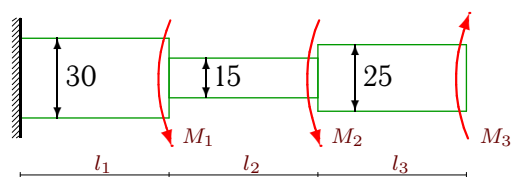
$M_1 = 27 \text{ кНм}, M_2 = 10 \text{ кНм}, M_3 = 7 \text{ кНм},$
 $l_1 = 2.4 \text{ м}, l_2 = 2.8 \text{ м}, l_3 = 3 \text{ м}.$

Задача M28.7.



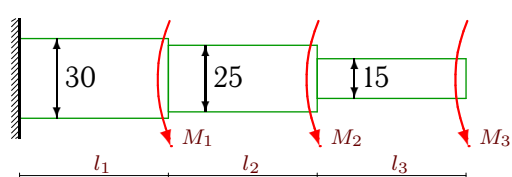
$M_1 = 24 \text{ кНм}, M_2 = 20 \text{ кНм}, M_3 = 7 \text{ кНм},$
 $l_1 = 3.6 \text{ м}, l_2 = 2.6 \text{ м}, l_3 = 3 \text{ м}.$

Задача M28.8.



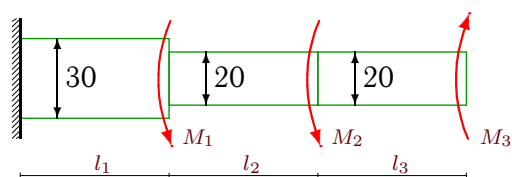
$M_1 = 48 \text{ кНм}, M_2 = 14 \text{ кНм}, M_3 = 27 \text{ кНм},$
 $l_1 = 3.8 \text{ м}, l_2 = 3.4 \text{ м}, l_3 = 2.4 \text{ м}.$

Задача M28.9.



$M_1 = 44 \text{ кНм}, M_2 = 15 \text{ кНм}, M_3 = 65 \text{ кНм},$
 $l_1 = 3.8 \text{ м}, l_2 = 3.2 \text{ м}, l_3 = 4 \text{ м}.$

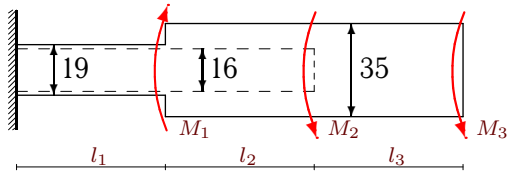
Задача M28.10.



$M_1 = 13 \text{ кНм}, M_2 = 24 \text{ кНм}, M_3 = 16 \text{ кНм},$
 $l_1 = 3.2 \text{ м}, l_2 = 3.6 \text{ м}, l_3 = 2.6 \text{ м}.$

Задача M28.11.

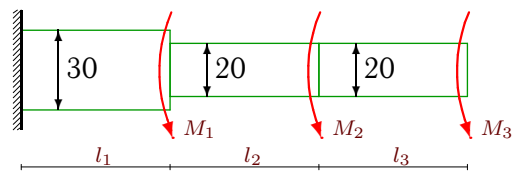
1



$M_1=45\text{кНм}$, $M_2=70\text{кНм}$, $M_3=24\text{кНм}$,
 $l_1=2.4\text{м}$, $l_2=4\text{м}$, $l_3=3.8\text{м}$.

Задача M28.12.

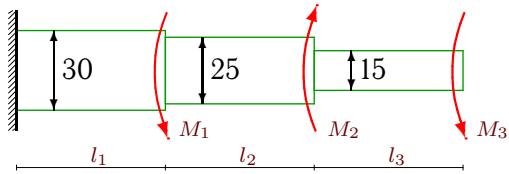
1



$M_1=75\text{кНм}$, $M_2=75\text{кНм}$, $M_3=35\text{кНм}$,
 $l_1=4\text{м}$, $l_2=4\text{м}$, $l_3=4\text{м}$.

Задача M28.13.

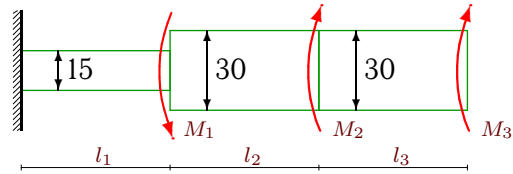
1



$M_1=24\text{кНм}$, $M_2=20\text{кНм}$, $M_3=7\text{кНм}$,
 $l_1=3.6\text{м}$, $l_2=2.6\text{м}$, $l_3=3\text{м}$.

Задача M28.14.

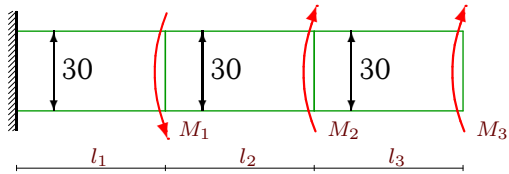
1



$M_1=8\text{кНм}$, $M_2=12\text{кНм}$, $M_3=44\text{кНм}$,
 $l_1=3.2\text{м}$, $l_2=2.6\text{м}$, $l_3=2.2\text{м}$.

Задача M28.15.

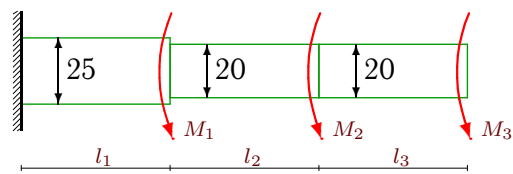
1



$M_1=21\text{кНм}$, $M_2=21\text{кНм}$, $M_3=21\text{кНм}$,
 $l_1=3.6\text{м}$, $l_2=2.4\text{м}$, $l_3=2.4\text{м}$.

Задача M28.16.

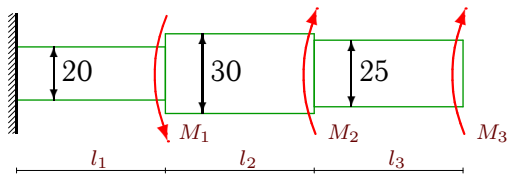
1



$M_1=28\text{кНм}$, $M_2=52\text{кНм}$, $M_3=45\text{кНм}$,
 $l_1=3.4\text{м}$, $l_2=3.8\text{м}$, $l_3=3.6\text{м}$.

Задача M28.17.

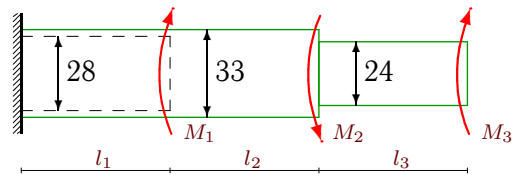
1



$M_1=36\text{кНм}$, $M_2=7\text{кНм}$, $M_3=30\text{кНм}$,
 $l_1=3.8\text{м}$, $l_2=2.8\text{м}$, $l_3=2.4\text{м}$.

Задача M28.18.

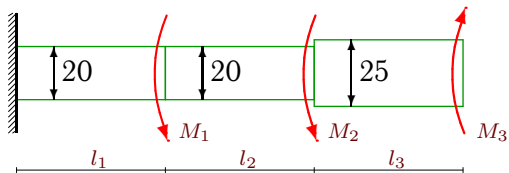
1



$M_1=60\text{кНм}$, $M_2=35\text{кНм}$, $M_3=24\text{кНм}$,
 $l_1=2.2\text{м}$, $l_2=4\text{м}$, $l_3=2.4\text{м}$.

Задача M28.19.

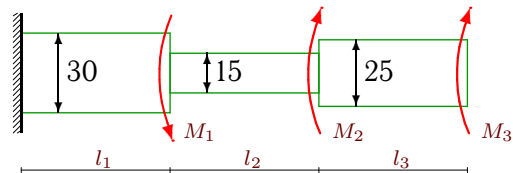
1



$M_1=60\text{кНм}$, $M_2=14\text{кНм}$, $M_3=39\text{кНм}$,
 $l_1=4\text{м}$, $l_2=3.4\text{м}$, $l_3=2.4\text{м}$.

Задача M28.20.

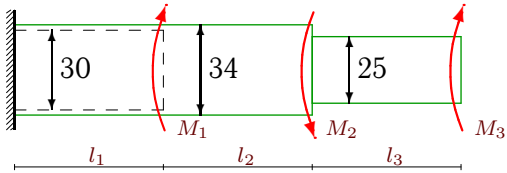
1



$M_1=6\text{кНм}$, $M_2=24\text{кНм}$, $M_3=24\text{кНм}$,
 $l_1=3.2\text{м}$, $l_2=2.2\text{м}$, $l_3=2.2\text{м}$.

Задача M28.21.

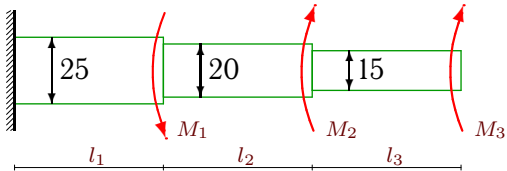
1



$M_1=60\text{кНм}$, $M_2=40\text{кНм}$, $M_3=26\text{кНм}$,
 $l_1=2.2\text{м}$, $l_2=4\text{м}$, $l_3=2.6\text{м}$.

Задача M28.23.

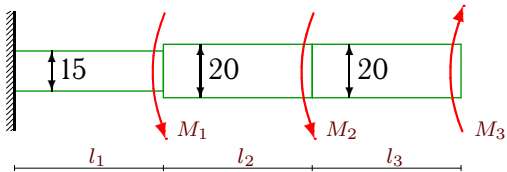
1



$M_1=27\text{кНм}$, $M_2=9\text{кНм}$, $M_3=8\text{кНм}$,
 $l_1=3.6\text{м}$, $l_2=2.8\text{м}$, $l_3=2.8\text{м}$.

Задача M28.25.

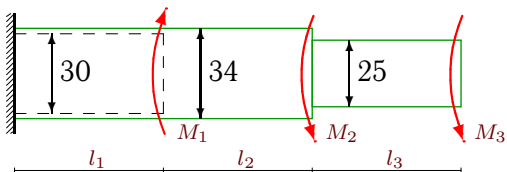
1



$M_1=30\text{кНм}$, $M_2=45\text{кНм}$, $M_3=14\text{кНм}$,
 $l_1=3.4\text{м}$, $l_2=4\text{м}$, $l_3=2.8\text{м}$.

Задача M28.27.

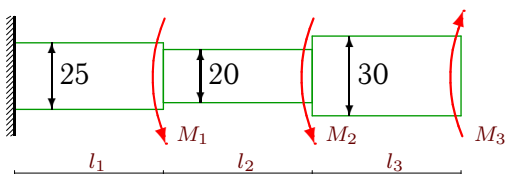
1



$M_1=40\text{кНм}$, $M_2=7\text{кНм}$, $M_3=40\text{кНм}$,
 $l_1=2.2\text{м}$, $l_2=3\text{м}$, $l_3=3.8\text{м}$.

Задача M28.29.

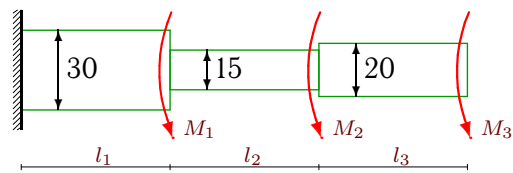
1



$M_1=50\text{кНм}$, $M_2=7\text{кНм}$, $M_3=10\text{кНм}$,
 $l_1=4\text{м}$, $l_2=3\text{м}$, $l_3=2.8\text{м}$.

Задача M28.22.

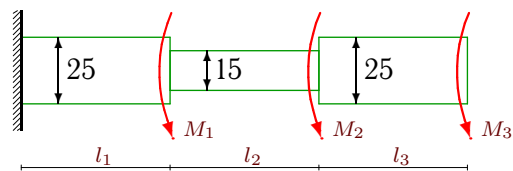
1



$M_1=52\text{кНм}$, $M_2=36\text{кНм}$, $M_3=22\text{кНм}$,
 $l_1=3.8\text{м}$, $l_2=3.6\text{м}$, $l_3=3.4\text{м}$.

Задача M28.24.

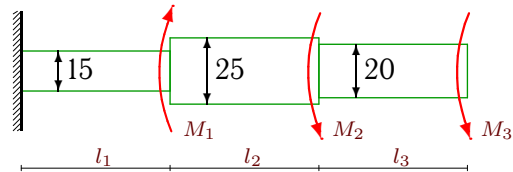
1



$M_1=48\text{кНм}$, $M_2=20\text{кНм}$, $M_3=7\text{кНм}$,
 $l_1=3.8\text{м}$, $l_2=3.4\text{м}$, $l_3=3\text{м}$.

Задача M28.26.

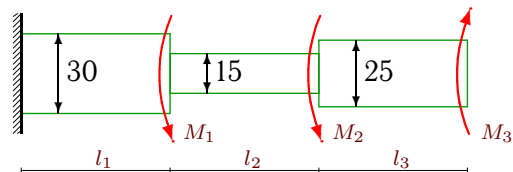
1



$M_1=20\text{кНм}$, $M_2=7\text{кНм}$, $M_3=28\text{кНм}$,
 $l_1=2.6\text{м}$, $l_2=3\text{м}$, $l_3=3.8\text{м}$.

Задача M28.28.

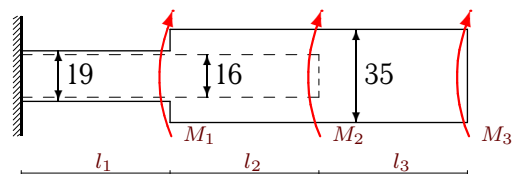
1



$M_1=39\text{кНм}$, $M_2=27\text{кНм}$, $M_3=14\text{кНм}$,
 $l_1=3.6\text{м}$, $l_2=3.6\text{м}$, $l_3=2.8\text{м}$.

Задача M28.30.

1



$M_1=18\text{кНм}$, $M_2=24\text{кНм}$, $M_3=40\text{кНм}$,
 $l_1=2.4\text{м}$, $l_2=2.2\text{м}$, $l_3=2.2\text{м}$.

М28 Ответы.**Кручение стержней кругового сечения**

17.02.2012

№	φ_1	φ_2	φ_3	τ_1	τ_2	τ_3
	рад·100			МПа		
1	-3.380	-3.681	-3.708	-72.433	-13.690	-1.132
2	-0.108	-0.187	-0.821	-3.585	-3.395	-13.581
3	-0.153	-1.868	-1.802	-4.237	-46.780	2.452
4	1.241	11.276	15.803	38.788	158.448	67.906
5	-2.867	-3.054	-3.509	-45.271	-10.186	-14.006
6	-1.415	-1.422	-1.406	-44.810	-0.151	0.764
7	0.996	0.886	0.954	16.599	-4.237	2.282
8	0.209	-0.903	-1.114	6.602	-19.617	-8.801
9	0.741	1.575	8.114	23.390	26.076	98.087
10	0.106	0.335	0.004	3.961	5.093	-10.186
11	2.311	2.645	2.722	73.189	5.338	2.851
12	1.163	4.665	5.779	34.896	70.028	22.282
13	0.062	-0.048	0.480	2.075	-4.237	10.563
14	-3.863	-4.092	-4.244	-72.433	-10.563	-8.300
15	-0.119	-0.277	-0.357	-3.961	-7.922	-3.961
16	1.385	4.319	5.608	40.744	61.752	28.648
17	-0.030	-0.193	-0.428	-0.637	-6.979	-9.778
18	-0.240	-0.193	-0.414	-14.416	1.323	-8.842
19	1.114	0.438	0.133	22.282	-15.915	-12.712
20	-0.211	-2.867	-3.039	-7.922	-72.433	-7.823
21	-0.245	-0.191	-0.412	-15.134	1.601	-8.475
22	0.657	5.908	6.504	20.749	87.523	14.006
23	0.117	-0.261	-0.825	3.259	-10.823	-12.072
24	0.929	3.238	3.306	24.446	40.744	2.282
25	5.216	6.203	5.891	92.051	19.735	-8.913
26	0.981	1.323	2.170	22.635	11.408	17.825
27	0.037	0.172	0.667	2.303	5.374	13.038
28	0.294	1.471	1.344	9.809	19.617	-4.563
29	0.613	0.541	0.497	15.320	-1.910	-1.886
30	-3.868	-3.993	-4.067	-122.479	-3.634	-4.751

М28 файл о28m1A