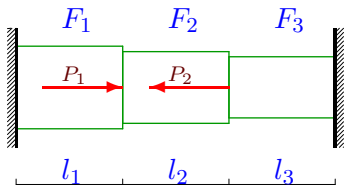
Напряженное состояние зажатого бруса

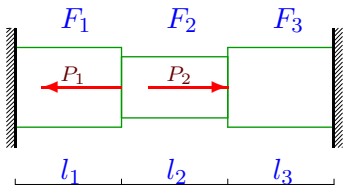
Найти реакции опор стального прямого призматического бруса кусочно-постоянного сечения, закрепленного по концам. К брусу приложены силы P_1, P_2. Построить эпюры продольных сил, нормальных напряжений, относительных удлинений и горизонтальных смещений. Модуль упругости материала $E = 2 \cdot 10^5$МПа.

Задача 17.1. 2



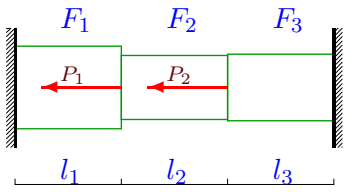
$P_1 = 77$кН, $P_2 = 37$кН,
$F_1 = 31$см^2, $F_2 = 27$см^2,
$F_3 = 23$см^2,
$l_1 = 3$м, $l_2 = 2$м, $l_3 = 3$м.

Задача 17.2. 2



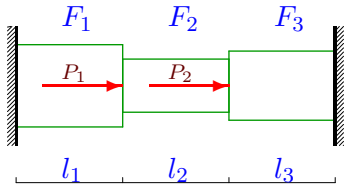
$P_1 = 160$кН, $P_2 = 190$кН,
$F_1 = 30$см^2, $F_2 = 23$см^2,
$F_3 = 30$см^2,
$l_1 = 2$м, $l_2 = 4$м, $l_3 = 3$м.

Задача 17.3. 2



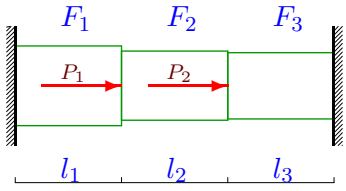
$P_1 = 66$кН, $P_2 = 70$кН,
$F_1 = 31$см^2, $F_2 = 24$см^2,
$F_3 = 25$см^2,
$l_1 = 2$м, $l_2 = 2$м, $l_3 = 3$м.

Задача 17.4. 2



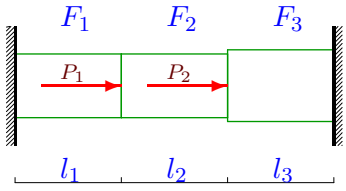
$P_1 = 38$кН, $P_2 = 120$кН,
$F_1 = 31$см^2, $F_2 = 20$см^2,
$F_3 = 26$см^2,
$l_1 = 3$м, $l_2 = 3$м, $l_3 = 4$м.

Задача 17.5. 2



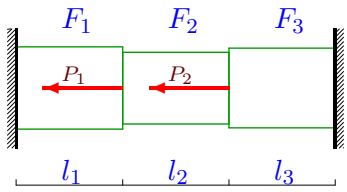
$P_1 = 39$кН, $P_2 = 156$кН,
$F_1 = 30$см^2, $F_2 = 26$см^2,
$F_3 = 25$см^2,
$l_1 = 3$м, $l_2 = 3$м, $l_3 = 3$м.

Задача 17.6. 2



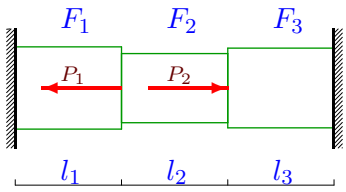
$P_1 = 72$кН, $P_2 = 35$кН,
$F_1 = 24$см^2, $F_2 = 24$см^2,
$F_3 = 27$см^2,
$l_1 = 3$м, $l_2 = 3$м, $l_3 = 3$м.

Задача 17.7. 2



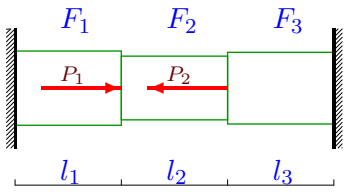
$P_1 = 32$кН, $P_2 = 117$кН,
$F_1 = 31$см^2, $F_2 = 27$см^2,
$F_3 = 30$см^2,
$l_1 = 2$м, $l_2 = 2$м, $l_3 = 3$м.

Задача 17.8. 2



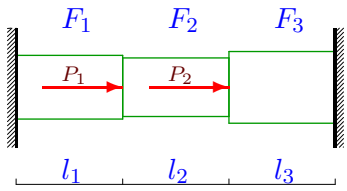
$P_1 = 144$кН, $P_2 = 35$кН,
$F_1 = 31$см^2, $F_2 = 26$см^2,
$F_3 = 30$см^2,
$l_1 = 2$м, $l_2 = 3$м, $l_3 = 3$м.

Задача 17.9. 2



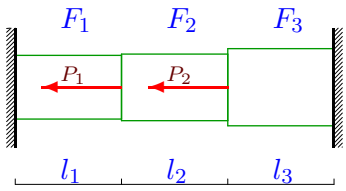
$P_1 = 77$кН, $P_2 = 80$кН,
$F_1 = 28$см^2, $F_2 = 24$см^2,
$F_3 = 27$см^2,
$l_1 = 3$м, $l_2 = 2$м, $l_3 = 4$м.

Задача 17.10. 2



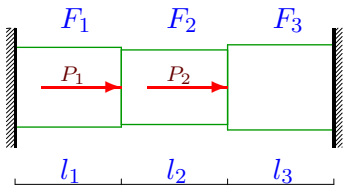
$P_1 = 78$кН, $P_2 = 128$кН,
$F_1 = 24$см^2, $F_2 = 22$см^2,
$F_3 = 27$см^2,
$l_1 = 3$м, $l_2 = 3$м, $l_3 = 2$м.

Задача 17.11. 2



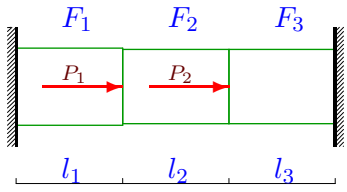
$P_1 = 99$кН, $P_2 = 80$кН,
$F_1 = 24$см^2, $F_2 = 25$см^2,
$F_3 = 29$см^2,
$l_1 = 2$м, $l_2 = 2$м, $l_3 = 4$м.

Задача 17.12. 2



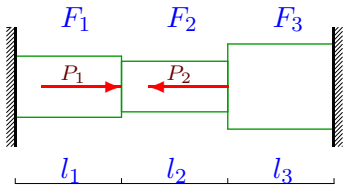
$P_1 = 77$кН, $P_2 = 195$кН,
$F_1 = 30$см^2, $F_2 = 28$см^2,
$F_3 = 32$см^2,
$l_1 = 3$м, $l_2 = 4$м, $l_3 = 3$м.

Задача 17.13. 2



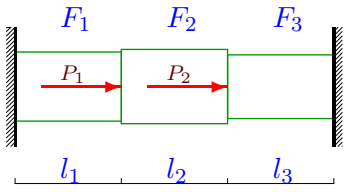
$P_1 = 160$кН, $P_2 = 200$кН,
$F_1 = 29$см^2, $F_2 = 28$см^2,
$F_3 = 28$см^2,
$l_1 = 3$м, $l_2 = 4$м, $l_3 = 4$м.

Задача 17.14. 2



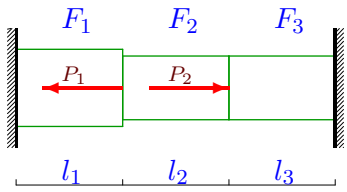
$P_1 = 93$кН, $P_2 = 128$кН,
$F_1 = 23$см^2, $F_2 = 19$см^2,
$F_3 = 32$см^2,
$l_1 = 3$м, $l_2 = 2$м, $l_3 = 2$м.

Задача 17.15. 2



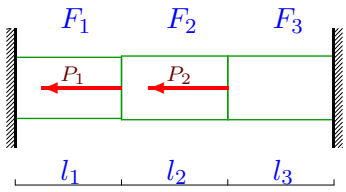
$P_1 = 39$кН, $P_2 = 144$кН,
$F_1 = 26$см^2, $F_2 = 28$см^2,
$F_3 = 24$см^2,
$l_1 = 3$м, $l_2 = 3$м, $l_3 = 3$м.

Задача 17.16. 2



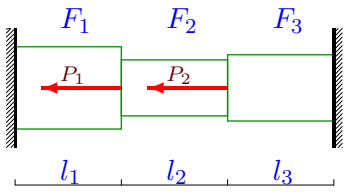
$P_1 = 152$кН, $P_2 = 108$кН,
$F_1 = 29$см^2, $F_2 = 24$см^2,
$F_3 = 24$см^2,
$l_1 = 2$м, $l_2 = 3$м, $l_3 = 3$м.

Задача 17.17. 2



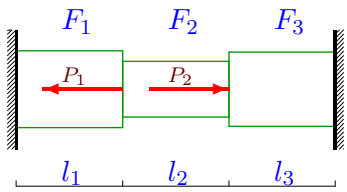
$P_1 = 102$кН, $P_2 = 31$кН,
$F_1 = 23$см^2, $F_2 = 24$см^2,
$F_3 = 24$см^2,
$l_1 = 2$м, $l_2 = 2$м, $l_3 = 2$м.

Задача 17.18. 2



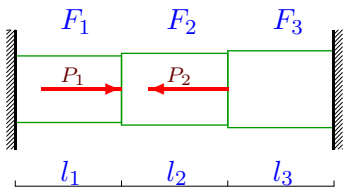
$P_1 = 68$кН, $P_2 = 31$кН,
$F_1 = 31$см^2, $F_2 = 21$см^2,
$F_3 = 25$см^2,
$l_1 = 2$м, $l_2 = 2$м, $l_3 = 2$м.

Задача 17.19. 2



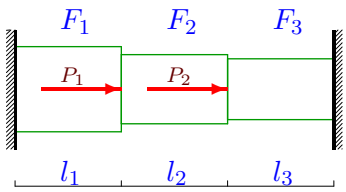
$P_1 = 140$кН, $P_2 = 77$кН,
$F_1 = 29$см^2, $F_2 = 21$см^2,
$F_3 = 28$см^2,
$l_1 = 2$м, $l_2 = 3$м, $l_3 = 3$м.

Задача 17.20. 2



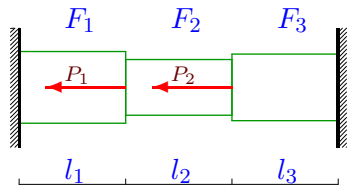
$P_1 = 68$кН, $P_2 = 32$кН,
$F_1 = 25$см^2, $F_2 = 27$см^2,
$F_3 = 29$см^2,
$l_1 = 3$м, $l_2 = 2$м, $l_3 = 2$м.

Задача 17.21. 2



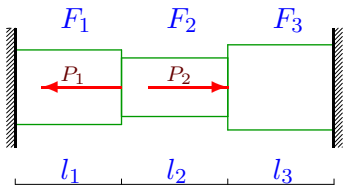
$P_1 = 185$кН, $P_2 = 74$кН,
$F_1 = 32$см^2, $F_2 = 26$см^2,
$F_3 = 23$см^2,
$l_1 = 4$м, $l_2 = 3$м, $l_3 = 3$м.

Задача 17.22. 2



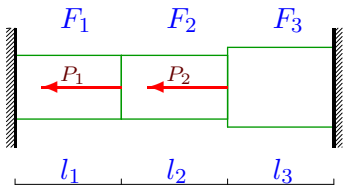
$P_1 = 102$кН, $P_2 = 31$кН,
$F_1 = 27$см^2, $F_2 = 21$см^2,
$F_3 = 25$см^2,
$l_1 = 2$м, $l_2 = 2$м, $l_3 = 2$м.

Задача 17.23. 2



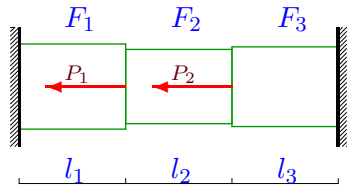
$P_1 = 80$кН, $P_2 = 185$кН,
$F_1 = 28$см^2, $F_2 = 22$см^2,
$F_3 = 32$см^2,
$l_1 = 2$м, $l_2 = 4$м, $l_3 = 3$м.

Задача 17.24. 2



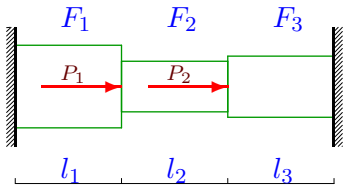
$P_1 = 99$кН, $P_2 = 72$кН,
$F_1 = 24$см^2, $F_2 = 24$см^2,
$F_3 = 30$см^2,
$l_1 = 2$м, $l_2 = 2$м, $l_3 = 3$м.

Задача 17.25. 2



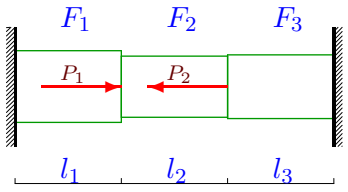
$P_1 = 96$кН, $P_2 = 102$кН,
$F_1 = 32$см^2, $F_2 = 28$см^2,
$F_3 = 30$см^2,
$l_1 = 2$м, $l_2 = 2$м, $l_3 = 2$м.

Задача 17.26. 2



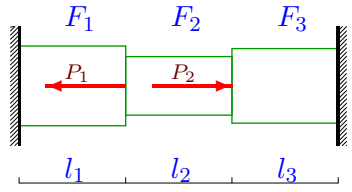
$P_1 = 111$кН, $P_2 = 74$кН,
$F_1 = 31$см^2, $F_2 = 19$см^2,
$F_3 = 23$см^2,
$l_1 = 3$м, $l_2 = 3$м, $l_3 = 3$м.

Задача 17.27. 2



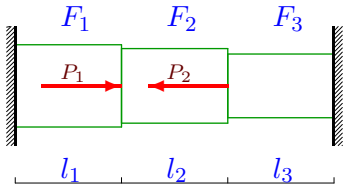
$P_1 = 96$кН, $P_2 = 96$кН,
$F_1 = 27$см^2, $F_2 = 23$см^2,
$F_3 = 24$см^2,
$l_1 = 3$м, $l_2 = 2$м, $l_3 = 2$м.

Задача 17.28. 2



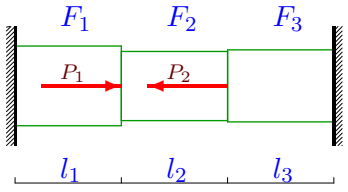
$P_1 = 108$кН, $P_2 = 36$кН,
$F_1 = 30$см^2, $F_2 = 22$см^2,
$F_3 = 28$см^2,
$l_1 = 2$м, $l_2 = 3$м, $l_3 = 3$м.

Задача 17.29. 2



$P_1 = 34$кН, $P_2 = 38$кН,
$F_1 = 31$см^2, $F_2 = 28$см^2,
$F_3 = 24$см^2,
$l_1 = 3$м, $l_2 = 2$м, $l_3 = 3$м.

Задача 17.30. 2



$P_1 = 77$кН, $P_2 = 38$кН,
$F_1 = 30$см^2, $F_2 = 26$см^2,
$F_3 = 27$см^2,
$l_1 = 3$м, $l_2 = 2$м, $l_3 = 3$м.

17.2

Напряженное состояние зажатого бруса

№	R_A	δ_1	δ_2
	кН	мм	
1	36.249	0.175	0.024
2	-72.894	-0.243	0.514
3	-81.464	-0.263	-0.327
4	74.903	0.362	0.639
5	83.188	0.416	0.671
6	57.846	0.362	0.273
7	-72.385	-0.234	-0.383
8	-98.304	-0.317	-0.053
9	17.637	0.094	-0.153
10	77.199	0.482	0.477
11	-108.243	-0.451	-0.488
12	108.435	0.542	0.767
13	190.886	0.987	1.208
14	25.493	0.166	-0.189
15	77.846	0.449	0.657
16	-76.811	-0.265	0.205
17	-77.214	-0.336	-0.232
18	-60.046	-0.194	-0.156
19	-83.865	-0.289	0.112
20	28.588	0.172	0.026
21	148.667	0.929	0.720
22	-81.642	-0.302	-0.205
23	-13.550	-0.048	0.556
24	-95.062	-0.396	-0.380
25	-99.988	-0.312	-0.327
26	108.170	0.523	0.501
27	29.665	0.165	-0.124
28	-72.352	-0.241	0.002
29	6.578	0.032	-0.066
30	35.608	0.178	0.019