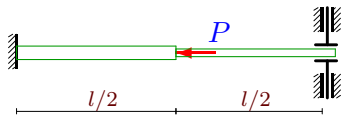
Устойчивость стержня переменного сечения

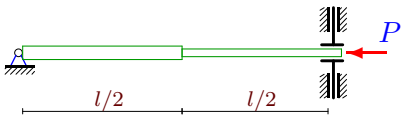
Прямолинейный стержень длиной l, закрепленный по концам, сжимается одной или двумя продольными силами. Задано соотношение моментов инерции участков стержня. Определить коэффициент μ приведения длины стержня в формуле для критической силы $P_{\text{кр}} = \pi^2 EJ/(\mu l)^2$.

Задача 34.1. *12*



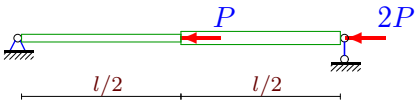
$J_1 = 1.1J,\ J_2 = J$

Задача 34.2. *12*



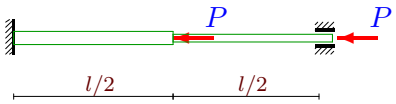
$J_1 = 1.1J,\ J_2 = J$

Задача 34.3. *12*



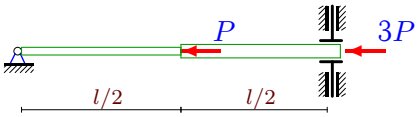
$J_1 = 0.7J,\ J_2 = J$

Задача 34.4. *12*



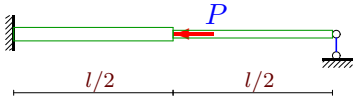
$J_1 = 1.2J,\ J_2 = J$

Задача 34.5. *12*



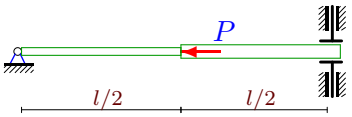
$J_1 = 0.7J,\ J_2 = J$

Задача 34.6. *12*



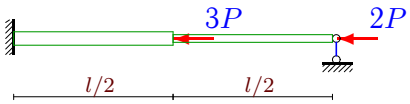
$J_1 = 1.2J,\ J_2 = J$

Задача 34.7. *12*



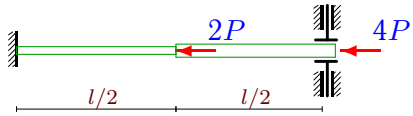
$J_1 = 0.7J,\ J_2 = J$

Задача 34.8. *12*



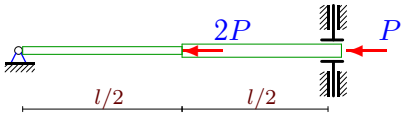
$J_1 = 1.1J,\ J_2 = J$

Задача 34.9. *12*



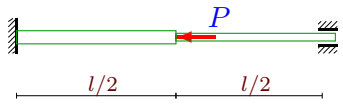
$J_1 = 0.9J,\ J_2 = J$

Задача 34.10. *12*



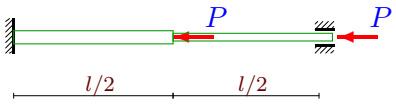
$J_1 = 0.9J,\ J_2 = J$

Задача 34.11. 12



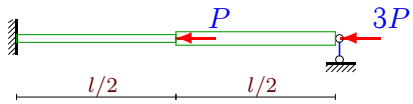
$J_1 = 1.1J,\ J_2 = J$

Задача 34.12. 12



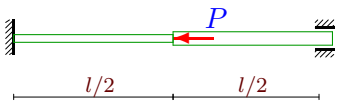
$J_1 = 1.1J,\ J_2 = J$

Задача 34.13. 12



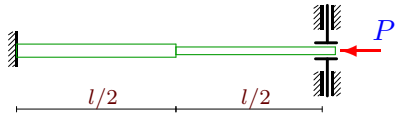
$J_1 = 0.7J,\ J_2 = J$

Задача 34.14. 12



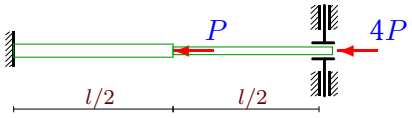
$J_1 = 0.7J,\ J_2 = J$

Задача 34.15. 12



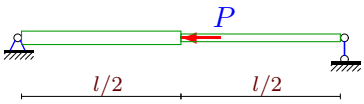
$J_1 = 1.1J,\ J_2 = J$

Задача 34.16. 12



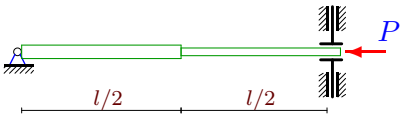
$J_1 = 1.2J,\ J_2 = J$

Задача 34.17. 12



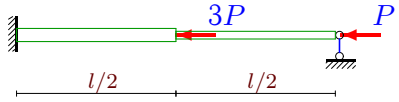
$J_1 = 1.2J,\ J_2 = J$

Задача 34.18. 12



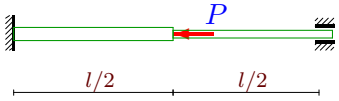
$J_1 = 1.1J,\ J_2 = J$

Задача 34.19. 12



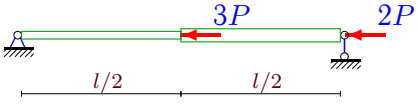
$J_1 = 1.2J,\ J_2 = J$

Задача 34.20. 12



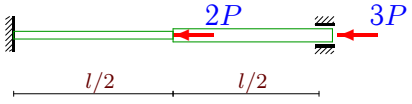
$J_1 = 1.1J,\ J_2 = J$

Задача 34.21. 12



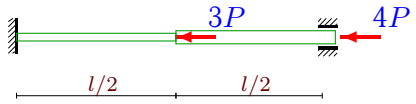
$J_1 = 0.9J,\ J_2 = J$

Задача 34.22. 12



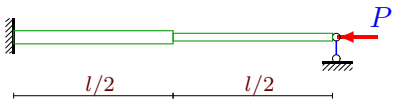
$J_1 = 0.9J,\ J_2 = J$

Задача 34.23. 12



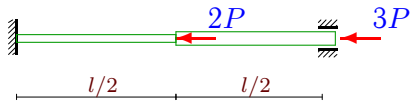
$J_1 = 0.7J,\ J_2 = J$

Задача 34.24. 12



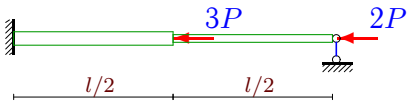
$J_1 = 1.1J,\ J_2 = J$

Задача 34.25. 12



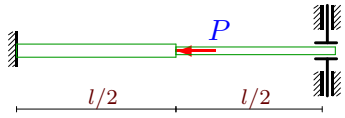
$J_1 = 0.7J,\ J_2 = J$

Задача 34.26. 12



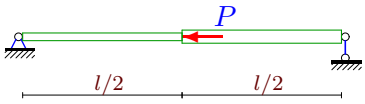
$J_1 = 1.1J,\ J_2 = J$

Задача 34.27. 12



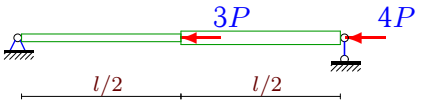
$J_1 = 1.2J,\ J_2 = J$

Задача 34.28. 12



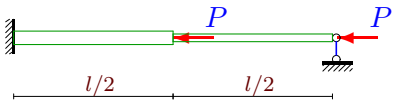
$J_1 = 0.8J,\ J_2 = J$

Задача 34.29. 12



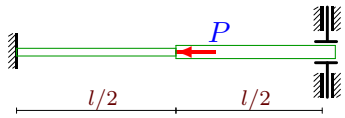
$J_1 = 0.8J,\ J_2 = J$

Задача 34.30. 12



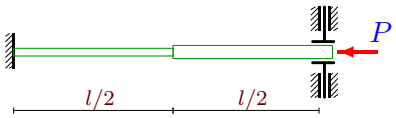
$J_1 = 1.2J,\ J_2 = J$

Задача 34.31. 12



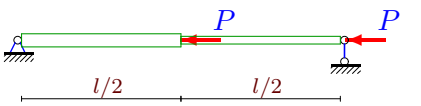
$J_1 = 0.7J,\ J_2 = J$

Задача 34.32. 12



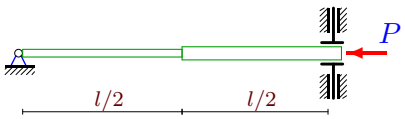
$J_1 = 0.8J,\ J_2 = J$

Задача 34.33. 12



$J_1 = 1.2J,\ J_2 = J$

Задача 34.34. 12



$J_1 = 0.8J,\ J_2 = J$

34.12

Устойчивость стержня переменного сечения

1	$Pl^2(0.73C_4^2 + 5.01C_4C_5 + 8.55C_5^2) - EJ(13.59C_4^2 + 93.28C_4C_5 + 161C_5^2)$
2	$Pl^2(31.09C_4^2 + 197.86C_4C_5 + 314.92C_5^2) - EJ(78.39C_4^2 + 497.27C_4C_5 + 790.69C_5^2)$
3	$Pl^2(1.21C_4^2 + 6.04C_4C_5 + 7.54C_5^2) - EJ(4.08C_4^2 + 20.77C_4C_5 + 26.84C_5^2)$
4	$Pl^2(2.86 \cdot 10^{-2}C_4^2 + 0.14C_4C_5 + 0.18C_5^2) - EJ(0.88C_4^2 + 4.35C_4C_5 + 5.53C_5^2)$
5	$Pl^2(118.93C_4^2 + 755.96C_4C_5 + 1201.62C_5^2) - EJ(72.03C_4^2 + 460.17C_4C_5 + 736.5C_5^2)$
6	$Pl^2(0.04C_4^2 + 0.2C_4C_5 + 0.26C_5^2) - EJ(1.98C_4^2 + 10.9C_4C_5 + 15.28C_5^2)$
7	$Pl^2(25.67C_4^2 + 162.39C_4C_5 + 256.86C_5^2) - EJ(72.03C_4^2 + 460.17C_4C_5 + 736.5C_5^2)$
8	$Pl^2(0.28C_4^2 + 1.55C_4C_5 + 2.18C_5^2) - EJ(1.89C_4^2 + 10.45C_4C_5 + 14.71C_5^2)$
9	$Pl^2(6.35C_4^2 + 44.12C_4C_5 + 76.78C_5^2) - EJ(12C_4^2 + 82.72C_4C_5 + 143.29C_5^2)$
10	$Pl^2(82.42C_4^2 + 522.63C_4C_5 + 828.64C_5^2) - EJ(75.21C_4^2 + 478.73C_4C_5 + 763.6C_5^2)$
11	$Pl^2(0.95 \cdot 10^{-2}C_4^2 + 0.05C_4C_5 + 0.06C_5^2) - EJ(0.84C_4^2 + 4.18C_4C_5 + 5.34C_5^2)$
12	$Pl^2(2.86 \cdot 10^{-2}C_4^2 + 0.14C_4C_5 + 0.18C_5^2) - EJ(0.84C_4^2 + 4.18C_4C_5 + 5.34C_5^2)$
13	$Pl^2(0.3C_4^2 + 1.65C_4C_5 + 2.34C_5^2) - EJ(1.53C_4^2 + 8.65C_4C_5 + 12.43C_5^2)$
14	$Pl^2(0.95 \cdot 10^{-2}C_4^2 + 0.05C_4C_5 + 0.06C_5^2) - EJ(0.68C_4^2 + 3.47C_4C_5 + 4.56C_5^2)$
15	$Pl^2(1.22C_4^2 + 8.52C_4C_5 + 14.92C_5^2) - EJ(13.59C_4^2 + 93.28C_4C_5 + 161C_5^2)$
16	$Pl^2(5.61C_4^2 + 39.1C_4C_5 + 68.23C_5^2) - EJ(14.38C_4^2 + 98.55C_4C_5 + 169.86C_5^2)$
17	$Pl^2(0.24C_4^2 + 1.18C_4C_5 + 1.44C_5^2) - EJ(5.28C_4^2 + 26.15C_4C_5 + 32.9C_5^2)$
18	$Pl^2(31.09C_4^2 + 197.86C_4C_5 + 314.92C_5^2) - EJ(78.39C_4^2 + 497.27C_4C_5 + 790.69C_5^2)$
19	$Pl^2(0.19C_4^2 + 1.06C_4C_5 + 1.49C_5^2) - EJ(1.98C_4^2 + 10.9C_4C_5 + 15.28C_5^2)$
20	$Pl^2(0.95 \cdot 10^{-2}C_4^2 + 0.05C_4C_5 + 0.06C_5^2) - EJ(0.84C_4^2 + 4.18C_4C_5 + 5.34C_5^2)$
21	$Pl^2(1.7C_4^2 + 8.4C_4C_5 + 10.42C_5^2) - EJ(4.56C_4^2 + 22.92C_4C_5 + 29.26C_5^2)$
22	$Pl^2(7.62 \cdot 10^{-2}C_4^2 + 0.38C_4C_5 + 0.48C_5^2) - EJ(0.76C_4^2 + 3.83C_4C_5 + 4.95C_5^2)$
23	$Pl^2(10.48 \cdot 10^{-2}C_4^2 + 0.52C_4C_5 + 0.65C_5^2) - EJ(0.68C_4^2 + 3.47C_4C_5 + 4.56C_5^2)$
24	$Pl^2(0.09C_4^2 + 0.49C_4C_5 + 0.7C_5^2) - EJ(1.89C_4^2 + 10.45C_4C_5 + 14.71C_5^2)$
25	$Pl^2(7.62 \cdot 10^{-2}C_4^2 + 0.38C_4C_5 + 0.48C_5^2) - EJ(0.68C_4^2 + 3.47C_4C_5 + 4.56C_5^2)$
26	$Pl^2(0.28C_4^2 + 1.55C_4C_5 + 2.18C_5^2) - EJ(1.89C_4^2 + 10.45C_4C_5 + 14.71C_5^2)$
27	$Pl^2(0.73C_4^2 + 5.01C_4C_5 + 8.55C_5^2) - EJ(14.38C_4^2 + 98.55C_4C_5 + 169.86C_5^2)$
28	$Pl^2(0.24C_4^2 + 1.18C_4C_5 + 1.44C_5^2) - EJ(4.32C_4^2 + 21.85C_4C_5 + 28.05C_5^2)$
29	$Pl^2(2.67C_4^2 + 13.26C_4C_5 + 16.52C_5^2) - EJ(4.32C_4^2 + 21.85C_4C_5 + 28.05C_5^2)$
30	$Pl^2(0.12C_4^2 + 0.68C_4C_5 + 0.96C_5^2) - EJ(1.98C_4^2 + 10.9C_4C_5 + 15.28C_5^2)$
31	$Pl^2(0.73C_4^2 + 5.01C_4C_5 + 8.55C_5^2) - EJ(10.43C_4^2 + 72.18C_4C_5 + 125.57C_5^2)$
32	$Pl^2(1.22C_4^2 + 8.52C_4C_5 + 14.92C_5^2) - EJ(11.22C_4^2 + 77.45C_4C_5 + 134.43C_5^2)$
33	$Pl^2(0.73C_4^2 + 3.61C_4C_5 + 4.49C_5^2) - EJ(5.28C_4^2 + 26.15C_4C_5 + 32.9C_5^2)$
34	$Pl^2(31.09C_4^2 + 197.86C_4C_5 + 314.92C_5^2) - EJ(73.62C_4^2 + 469.45C_4C_5 + 750.05C_5^2)$

№	μ	
1	0.733	$C_0 = 0,\ C_1 = 0,\ C_2 = 4C_4 + (25/2)C_5, C_3 = -4C_4 - 10C_5$
2	1.983	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$
3	1.754	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
4	0.566	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
5	4.064	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$
6	0.418	$C_0 = 0,\ C_1 = 0,\ C_2 = (3C_4 + 7C_5)/2,\ C_3 = -(5C_4 + 9C_5)/2$
7	1.920	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$
8	1.209	$C_0 = 0,\ C_1 = 0,\ C_2 = (3C_4 + 7C_5)/2,\ C_3 = -(5C_4 + 9C_5)/2$
9	2.306	$C_0 = 0,\ C_1 = 0,\ C_2 = 4C_4 + (25/2)C_5, C_3 = -4C_4 - 10C_5$
10	3.300	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$
11	0.339	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
12	0.580	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
13	1.373	$C_0 = 0,\ C_1 = 0,\ C_2 = (3C_4 + 7C_5)/2,\ C_3 = -(5C_4 + 9C_5)/2$
14	0.397	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
15	0.976	$C_0 = 0,\ C_1 = 0,\ C_2 = 4C_4 + (25/2)C_5, C_3 = -4C_4 - 10C_5$
16	2.022	$C_0 = 0,\ C_1 = 0,\ C_2 = 4C_4 + (25/2)C_5, C_3 = -4C_4 - 10C_5$
17	0.682	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
18	1.983	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$
19	0.980	$C_0 = 0,\ C_1 = 0,\ C_2 = (3C_4 + 7C_5)/2,\ C_3 = -(5C_4 + 9C_5)/2$
20	0.339	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
21	1.941	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
22	1.000	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
23	1.267	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
24	0.685	$C_0 = 0,\ C_1 = 0,\ C_2 = (3C_4 + 7C_5)/2,\ C_3 = -(5C_4 + 9C_5)/2$
25	1.080	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
26	1.209	$C_0 = 0,\ C_1 = 0,\ C_2 = (3C_4 + 7C_5)/2,\ C_3 = -(5C_4 + 9C_5)/2$
27	0.711	$C_0 = 0,\ C_1 = 0,\ C_2 = 4C_4 + (25/2)C_5, C_3 = -4C_4 - 10C_5$
28	0.786	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
29	2.507	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
30	0.787	$C_0 = 0,\ C_1 = 0,\ C_2 = (3C_4 + 7C_5)/2,\ C_3 = -(5C_4 + 9C_5)/2$
31	0.850	$C_0 = 0,\ C_1 = 0,\ C_2 = 4C_4 + (25/2)C_5, C_3 = -4C_4 - 10C_5$
32	1.055	$C_0 = 0,\ C_1 = 0,\ C_2 = 4C_4 + (25/2)C_5, C_3 = -4C_4 - 10C_5$
33	1.167	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
34	2.043	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$