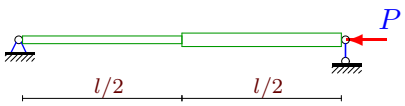
Устойчивость стержня переменного сечения

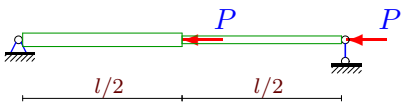
Прямолинейный стержень длиной l, закрепленный по концам, сжимается одной или двумя продольными силами. Задано соотношение моментов инерции участков стержня. Определить коэффициент μ приведения длины стержня в формуле для критической силы $P_{\text{кр}} = \pi^2 EJ/(\mu l)^2$.

Задача 34.1. 13



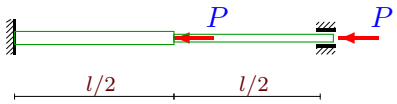
$J_1 = 0.8J,\ J_2 = J$

Задача 34.2. 13



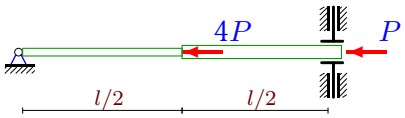
$J_1 = 1.1J,\ J_2 = J$

Задача 34.3. 13



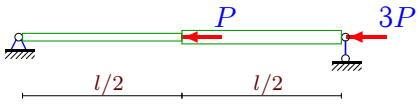
$J_1 = 1.2J,\ J_2 = J$

Задача 34.4. 13



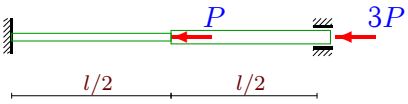
$J_1 = 0.9J,\ J_2 = J$

Задача 34.5. 13



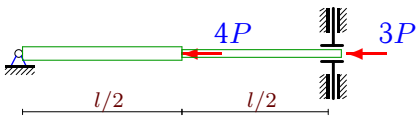
$J_1 = 0.9J,\ J_2 = J$

Задача 34.6. 13



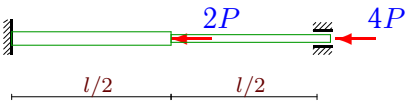
$J_1 = 0.8J,\ J_2 = J$

Задача 34.7. 13



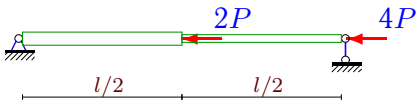
$J_1 = 1.2J,\ J_2 = J$

Задача 34.8. 13



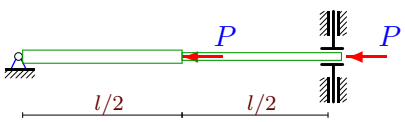
$J_1 = 1.2J,\ J_2 = J$

Задача 34.9. 13



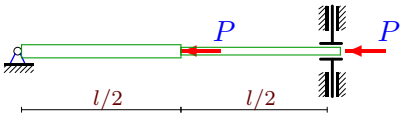
$J_1 = 1.2J,\ J_2 = J$

Задача 34.10. 13



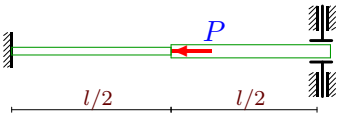
$J_1 = 1.1J,\ J_2 = J$

Задача 34.11. 13



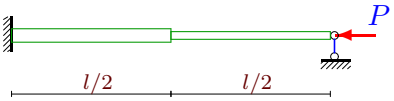
$J_1 = 1.2J,\ J_2 = J$

Задача 34.12. 13



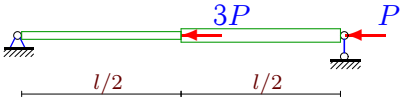
$J_1 = 0.9J,\ J_2 = J$

Задача 34.13. 13



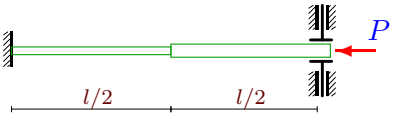
$J_1 = 1.1J,\ J_2 = J$

Задача 34.14. 13



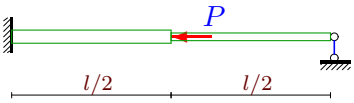
$J_1 = 0.8J,\ J_2 = J$

Задача 34.15. 13



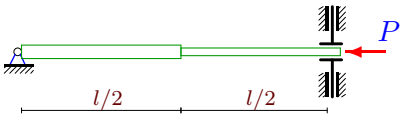
$J_1 = 0.9J,\ J_2 = J$

Задача 34.16. 13



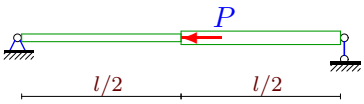
$J_1 = 1.1J,\ J_2 = J$

Задача 34.17. 13



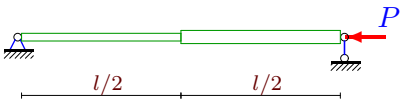
$J_1 = 1.2J,\ J_2 = J$

Задача 34.18. 13



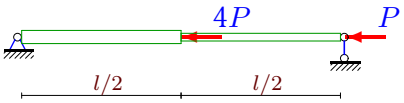
$J_1 = 0.8J,\ J_2 = J$

Задача 34.19. 13



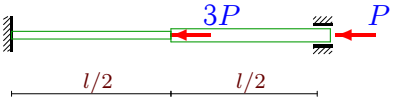
$J_1 = 0.9J,\ J_2 = J$

Задача 34.20. 13



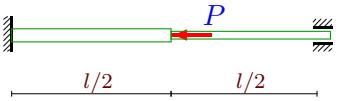
$J_1 = 1.1J,\ J_2 = J$

Задача 34.21. 13



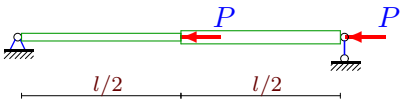
$J_1 = 0.8J,\ J_2 = J$

Задача 34.22. 13



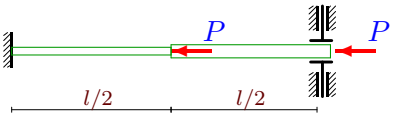
$J_1 = 1.1J,\ J_2 = J$

Задача 34.23. 13



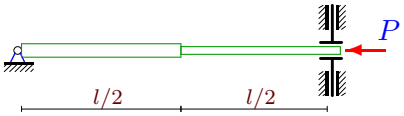
$J_1 = 0.9J,\ J_2 = J$

Задача 34.24. 13



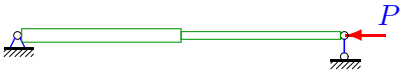
$J_1 = 0.9J,\ J_2 = J$

Задача 34.25. 13



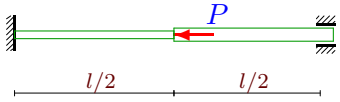
$J_1 = 1.1J,\ J_2 = J$

Задача 34.26. 13



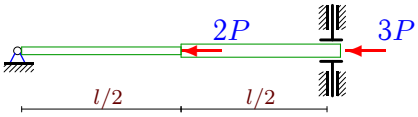
$J_1 = 1.2J,\ J_2 = J$

Задача 34.27. 13



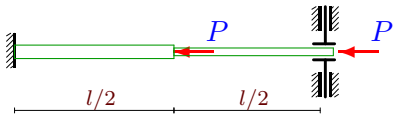
$J_1 = 0.9J,\ J_2 = J$

Задача 34.28. 13



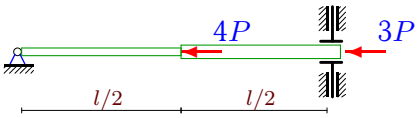
$J_1 = 0.9J,\ J_2 = J$

Задача 34.29. 13



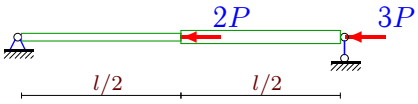
$J_1 = 1.2J,\ J_2 = J$

Задача 34.30. 13



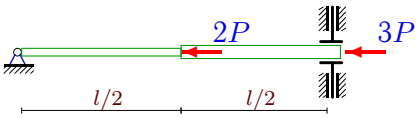
$J_1 = 0.9J,\ J_2 = J$

Задача 34.31. 13



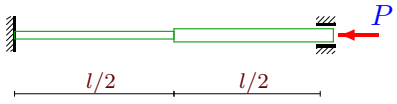
$J_1 = 0.7J,\ J_2 = J$

Задача 34.32. 13



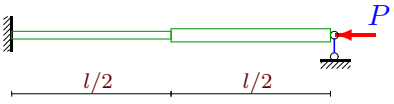
$J_1 = 0.7J,\ J_2 = J$

Задача 34.33. 13



$J_1 = 0.7J,\ J_2 = J$

Задача 34.34. 13



$J_1 = 0.9J,\ J_2 = J$

34.13

Устойчивость стержня переменного сечения

1	$Pl^2(0.49C_4^2 + 2.43C_4C_5 + 3.05C_5^2) - EJ(4.32C_4^2 + 21.85C_4C_5 + 28.05C_5^2)$
2	$Pl^2(0.73C_4^2 + 3.61C_4C_5 + 4.49C_5^2) - EJ(5.04C_4^2 + 25.08C_4C_5 + 31.69C_5^2)$
3	$Pl^2(2.86 \cdot 10^{-2}C_4^2 + 0.14C_4C_5 + 0.18C_5^2) - EJ(0.88C_4^2 + 4.35C_4C_5 + 5.53C_5^2)$
4	$Pl^2(133.76C_4^2 + 847.4C_4C_5 + 1342.35C_5^2) - EJ(75.21C_4^2 + 478.73C_4C_5 + 763.6C_5^2)$
5	$Pl^2(1.7C_4^2 + 8.47C_4C_5 + 10.59C_5^2) - EJ(4.56C_4^2 + 22.92C_4C_5 + 29.26C_5^2)$
6	$Pl^2(6.67 \cdot 10^{-2}C_4^2 + 0.33C_4C_5 + 0.42C_5^2) - EJ(0.72C_4^2 + 3.65C_4C_5 + 4.75C_5^2)$
7	$Pl^2(195.93C_4^2 + 1243.11C_4C_5 + 1972.2C_5^2) - EJ(79.98C_4^2 + 506.55C_4C_5 + 804.23C_5^2)$
8	$Pl^2(9.52 \cdot 10^{-2}C_4^2 + 0.47C_4C_5 + 0.6C_5^2) - EJ(0.88C_4^2 + 4.35C_4C_5 + 5.53C_5^2)$
9	$Pl^2(2.43C_4^2 + 12.08C_4C_5 + 15.08C_5^2) - EJ(5.28C_4^2 + 26.15C_4C_5 + 32.9C_5^2)$
10	$Pl^2(56.75C_4^2 + 360.24C_4C_5 + 571.78C_5^2) - EJ(78.39C_4^2 + 497.27C_4C_5 + 790.69C_5^2)$
11	$Pl^2(56.75C_4^2 + 360.24C_4C_5 + 571.78C_5^2) - EJ(79.98C_4^2 + 506.55C_4C_5 + 804.23C_5^2)$
12	$Pl^2(0.73C_4^2 + 5.01C_4C_5 + 8.55C_5^2) - EJ(12C_4^2 + 82.72C_4C_5 + 143.29C_5^2)$
13	$Pl^2(0.09C_4^2 + 0.49C_4C_5 + 0.7C_5^2) - EJ(1.89C_4^2 + 10.45C_4C_5 + 14.71C_5^2)$
14	$Pl^2(1.21C_4^2 + 5.97C_4C_5 + 7.37C_5^2) - EJ(4.32C_4^2 + 21.85C_4C_5 + 28.05C_5^2)$
15	$Pl^2(1.22C_4^2 + 8.52C_4C_5 + 14.92C_5^2) - EJ(12C_4^2 + 82.72C_4C_5 + 143.29C_5^2)$
16	$Pl^2(0.04C_4^2 + 0.2C_4C_5 + 0.26C_5^2) - EJ(1.89C_4^2 + 10.45C_4C_5 + 14.71C_5^2)$
17	$Pl^2(31.09C_4^2 + 197.86C_4C_5 + 314.92C_5^2) - EJ(79.98C_4^2 + 506.55C_4C_5 + 804.23C_5^2)$
18	$Pl^2(0.24C_4^2 + 1.18C_4C_5 + 1.44C_5^2) - EJ(4.32C_4^2 + 21.85C_4C_5 + 28.05C_5^2)$
19	$Pl^2(0.49C_4^2 + 2.43C_4C_5 + 3.05C_5^2) - EJ(4.56C_4^2 + 22.92C_4C_5 + 29.26C_5^2)$
20	$Pl^2(1.46C_4^2 + 7.16C_4C_5 + 8.82C_5^2) - EJ(5.04C_4^2 + 25.08C_4C_5 + 31.69C_5^2)$
21	$Pl^2(4.76 \cdot 10^{-2}C_4^2 + 0.23C_4C_5 + 0.3C_5^2) - EJ(0.72C_4^2 + 3.65C_4C_5 + 4.75C_5^2)$
22	$Pl^2(0.95 \cdot 10^{-2}C_4^2 + 0.05C_4C_5 + 0.06C_5^2) - EJ(0.84C_4^2 + 4.18C_4C_5 + 5.34C_5^2)$
23	$Pl^2(0.73C_4^2 + 3.61C_4C_5 + 4.49C_5^2) - EJ(4.56C_4^2 + 22.92C_4C_5 + 29.26C_5^2)$
24	$Pl^2(1.95C_4^2 + 13.53C_4C_5 + 23.47C_5^2) - EJ(12C_4^2 + 82.72C_4C_5 + 143.29C_5^2)$
25	$Pl^2(31.09C_4^2 + 197.86C_4C_5 + 314.92C_5^2) - EJ(78.39C_4^2 + 497.27C_4C_5 + 790.69C_5^2)$
26	$Pl^2(0.49C_4^2 + 2.43C_4C_5 + 3.05C_5^2) - EJ(5.28C_4^2 + 26.15C_4C_5 + 32.9C_5^2)$
27	$Pl^2(0.95 \cdot 10^{-2}C_4^2 + 0.05C_4C_5 + 0.06C_5^2) - EJ(0.76C_4^2 + 3.83C_4C_5 + 4.95C_5^2)$
28	$Pl^2(144.6C_4^2 + 918.34C_4C_5 + 1458.48C_5^2) - EJ(75.21C_4^2 + 478.73C_4C_5 + 763.6C_5^2)$
29	$Pl^2(1.95C_4^2 + 13.53C_4C_5 + 23.47C_5^2) - EJ(14.38C_4^2 + 98.55C_4C_5 + 169.86C_5^2)$
30	$Pl^2(195.93C_4^2 + 1243.11C_4C_5 + 1972.2C_5^2) - EJ(75.21C_4^2 + 478.73C_4C_5 + 763.6C_5^2)$
31	$Pl^2(1.94C_4^2 + 9.65C_4C_5 + 12.03C_5^2) - EJ(4.08C_4^2 + 20.77C_4C_5 + 26.84C_5^2)$
32	$Pl^2(144.6C_4^2 + 918.34C_4C_5 + 1458.48C_5^2) - EJ(72.03C_4^2 + 460.17C_4C_5 + 736.5C_5^2)$
33	$Pl^2(1.9 \cdot 10^{-2}C_4^2 + 0.1C_4C_5 + 0.12C_5^2) - EJ(0.68C_4^2 + 3.47C_4C_5 + 4.56C_5^2)$
34	$Pl^2(0.09C_4^2 + 0.49C_4C_5 + 0.7C_5^2) - EJ(1.71C_4^2 + 9.55C_4C_5 + 13.57C_5^2)$

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1	1.059	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
2	1.195	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
3	0.566	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
4	4.210	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$
5	1.925	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
6	0.966	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
7	4.920	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$
8	1.035	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
9	2.132	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
10	2.673	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$
11	2.649	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$
12	0.784	$C_0 = 0,\ C_1 = 0,\ C_2 = 4C_4 + (25/2)C_5, C_3 = -4C_4 - 10C_5$
13	0.685	$C_0 = 0,\ C_1 = 0,\ C_2 = (3C_4 + 7C_5)/2,\ C_3 = -(5C_4 + 9C_5)/2$
14	1.717	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
15	1.026	$C_0 = 0,\ C_1 = 0,\ C_2 = 4C_4 + (25/2)C_5, C_3 = -4C_4 - 10C_5$
16	0.429	$C_0 = 0,\ C_1 = 0,\ C_2 = (3C_4 + 7C_5)/2,\ C_3 = -(5C_4 + 9C_5)/2$
17	1.968	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$
18	0.786	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
19	1.027	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
20	1.701	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
21	0.831	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
22	0.339	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
23	1.267	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
24	1.272	$C_0 = 0,\ C_1 = 0,\ C_2 = 4C_4 + (25/2)C_5, C_3 = -4C_4 - 10C_5$
25	1.983	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$
26	0.956	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
27	0.364	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
28	4.361	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$
29	1.172	$C_0 = 0,\ C_1 = 0,\ C_2 = 4C_4 + (25/2)C_5, C_3 = -4C_4 - 10C_5$
30	5.083	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$
31	2.225	$C_0 = 0,\ C_1 = C_4 + (7/3)C_5,\ C_2 = 0,\ C_3 = -2C_4 - (10/3)C_5$
32	4.492	$C_0 = 0,\ C_1 = 8C_4 + 25C_5,\ C_2 = 0,\ C_3 = -4C_4 - 10C_5$
33	0.534	$C_0 = 0,\ C_1 = 0,\ C_2 = C_4 + 2C_5,\ C_3 = -2C_4 - 3C_5$
34	0.710	$C_0 = 0,\ C_1 = 0,\ C_2 = (3C_4 + 7C_5)/2,\ C_3 = -(5C_4 + 9C_5)/2$