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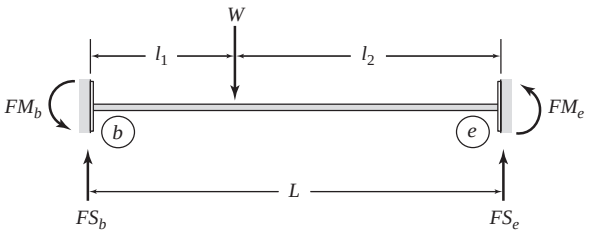
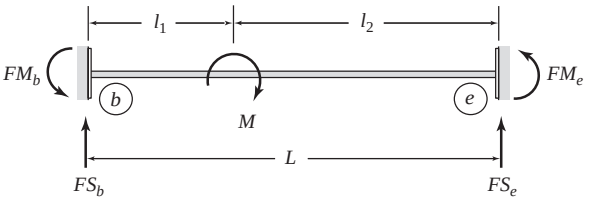
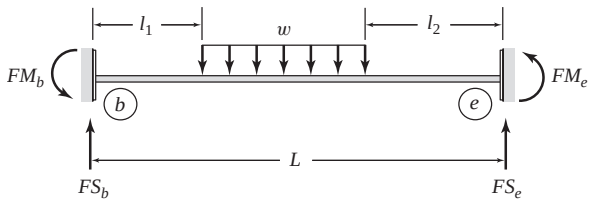
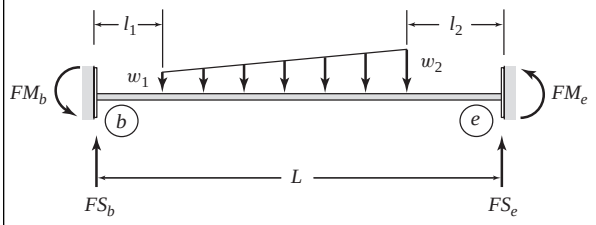
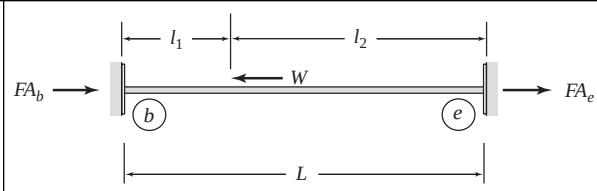
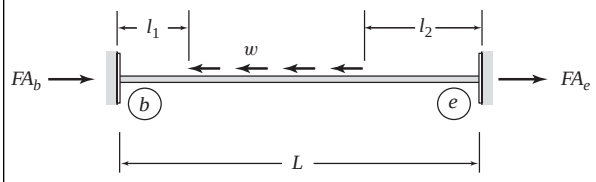
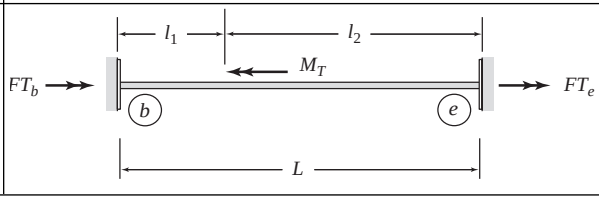
FIXED-END FORCE EXPRESSIONS

Fixed-End Moments, Shears and Axial Forces for Various Loading Conditions

No.	Loading	Equations for Fixed-End Moments, Shears, and Axial Forces
1.		$FS_b = \frac{Wl_2^2}{L^3}(3l_1 + l_2)$ $FM_b = \frac{Wl_1l_2^2}{L^2}$ $FS_e = \frac{Wl_1^2}{L^3}(l_1 + 3l_2)$ $FM_e = -\frac{Wl_1^2l_2}{L^2}$
2.		$FS_b = -\frac{6Ml_1l_2}{L^3}$ $FM_b = \frac{Ml_2}{L^2}(l_2 - 2l_1)$ $FS_e = \frac{6Ml_1l_2}{L^3}$ $FM_e = \frac{Ml_1}{L^2}(l_1 - 2l_2)$
3.		$FS_b = \frac{wL}{2}\left[1 - \frac{l_1}{L^4}(2L^3 - 2l_1^2L + l_1^3) - \frac{l_2^3}{L^4}(2L - l_2)\right]$ $FM_b = \frac{wL^2}{12}\left[1 - \frac{l_1^2}{L^4}(6L^2 - 8l_1L + 3l_1^2) - \frac{l_2^3}{L^4}(4L - 3l_2)\right]$ $FS_e = \frac{wL}{2}\left[1 - \frac{l_1^3}{L^4}(2L - l_1) - \frac{l_2}{L^4}(2L^3 - 2l_2^2L + l_2^3)\right]$ $FM_e = -\frac{wL^2}{12}\left[1 - \frac{l_1^3}{L^4}(4L - 3l_1) - \frac{l_2^2}{L^4}(6L^2 - 8l_2L + 3l_2^2)\right]$

No.	Loading	Equations for Fixed-End Moments, Shears, and Axial Forces
4.		$FS_b = \frac{w_1(L-l_1)^3}{20L^3}\left\{(7L+8l_1) - \frac{l_2(3L+2l_1)}{(L-l_1)} \times \left[1+\frac{l_2}{L-l_1}+\frac{l_2^2}{(L-l_1)^2}\right]+\frac{2l_2^4}{(L-l_1)^3}\right\} + \frac{w_2(L-l_1)^3}{20L^3}\left\{(3L+2l_1)\left[1+\frac{l_2}{L-l_1} + \frac{l_2^2}{(L-l_1)^2}\right] - \frac{l_2^3}{(L-l_1)^2}\left[2+\frac{15L-8l_2}{L-l_1}\right]\right\}$ $FM_b = \frac{w_1(L-l_1)^3}{60L^2}\left\{3(L+4l_1) - \frac{l_2(2L+3l_1)}{L-l_1} \times \left[1+\frac{l_2}{L-l_1}+\frac{l_2^2}{(L-l_1)^2}\right]+\frac{3l_2^4}{(L-l_1)^3}\right\} + \frac{w_2(L-l_1)^3}{60L^2}\left\{(2L+3l_1)\left[1+\frac{l_2}{L-l_1} + \frac{l_2^2}{(L-l_1)^2}\right] - \frac{3l_2^3}{(L-l_1)^2}\left[1+\frac{5L-4l_2}{L-l_1}\right]\right\}$ $FS_e = \left(\frac{w_1+w_2}{2}\right)(L-l_1-l_2) - FS_b$ $FM_e = \frac{L-l_1-l_2}{6}[w_1(-2L+2l_1-l_2) - w_2(L-l_1+2l_2)] + FS_b(L) - FM_b$
5.		$FA_b = \frac{Wl_2}{L}$ $FA_e = \frac{Wl_1}{L}$
6.		$FA_b = \frac{w}{2L}(L-l_1-l_2)(L-l_1+l_2)$ $FA_e = \frac{w}{2L}(L-l_1-l_2)(L+l_1-l_2)$
7.		$FT_b = \frac{M_T l_2}{L}$ $FT_e = \frac{M_T l_1}{L}$