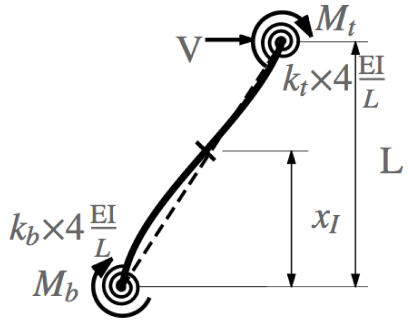
First iteration formulas



$$k_{sh} = \frac{k_b + k_t + 4\,k_b\,k_t}{3 + 4\,k_b + 4\,k_t + 4\,k_b\,k_t}\,\frac{12\,EI}{L^3}$$

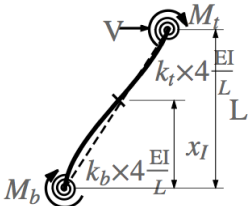
$$\begin{pmatrix} M_{\text{inner top}} \\ M_{\text{inner bottom}} \end{pmatrix} = \begin{pmatrix} +\frac{k_t+2k_bk_t}{k_b+k_t+4k_bk_t} \\ -\frac{k_b+2k_bk_t}{k_b+k_t+4k_bk_t} \end{pmatrix} \times V\,L$$

Note: In the first iteration, we assume: $M_b = M_t = 0$

Note: Special case of first floor with fixed or hinge support gives simpler expressions as follows:

$k_b \to \infty$ (fixed support at bottom)	$k_b = 0$ (hinge support at bottom
$k_{sh} = \frac{1+4k_t}{4+4k_t} \times \frac{12\,EI}{L^3}$	$k_{sh} = \frac{k_t}{3+4k_t} \times \frac{12\,EI}{L^3}$
$\begin{pmatrix} M_{\text{inner top}} \\ M_{\text{bottom inner}} \end{pmatrix} = \begin{pmatrix} \frac{2k_t}{1+4k_t} \\ \frac{1+2k_t}{1+4k_t} \end{pmatrix} \times VL$	$\begin{pmatrix} M_{\text{inner top}} \\ M_{\text{bottom inner}} \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \end{pmatrix} \times VL$

Second iteration formulas



$$k_{sh} = \frac{(k_b+k_t+4\,k_b\,k_t)}{((3+4\,k_b+4\,k_t+4\,k_b\,k_t) + 3\,(1+2\,k_t)\,(M_b/(V\,L)) + 3\,(1+2\,k_b)\,(M_t/(V\,L)))}\,\frac{12\,EI}{L^3}$$

$$\begin{pmatrix} M_{\text{inner top}} \\ M_{\text{inner bottom}} \end{pmatrix} = \begin{pmatrix} +\frac{k_t+2\,k_b\,k_t}{k_b+k_t+4\,k_b\,k_t} \\ -\frac{k_b+2\,k_b\,k_t}{k_b+k_t+4\,k_b\,k_t} \end{pmatrix} V\,L + \begin{pmatrix} +\frac{k_t}{k_b+k_t+4\,k_b\,k_t} \\ +\frac{k_t}{k_b+k_t+4\,k_b\,k_t} \end{pmatrix} M_b + \begin{pmatrix} -\frac{k_b}{k_b+k_t+4\,k_b\,k_t} \\ -\frac{k_b}{k_b+k_t+4\,k_b\,k_t} \end{pmatrix} M_t$$