

$$\begin{aligned}
 U_3 &= \frac{\begin{vmatrix} 2k & F & \cdot \\ -k & 0 & -k \\ \cdot & 0 & 2k \end{vmatrix}}{\begin{vmatrix} 2k & -k & \cdot \\ -k & 2k & -k \\ \cdot & -k & 2k \end{vmatrix}} = \frac{\frac{2Fk^2}{4k^3}}{\frac{F}{2k}} = \frac{F\ell}{8EA}
 \end{aligned}$$

$$\begin{aligned}
 U_4 &= \frac{\begin{vmatrix} 2k & -k & F \\ -k & 2k & 0 \\ \cdot & -k & 0 \end{vmatrix}}{\begin{vmatrix} 2k & -k & \cdot \\ -k & 2k & -k \\ \cdot & -k & 2k \end{vmatrix}} = \frac{\frac{Fk^2}{4k^3}}{\frac{F}{2k}} = \frac{F\ell}{16EA}
 \end{aligned}$$