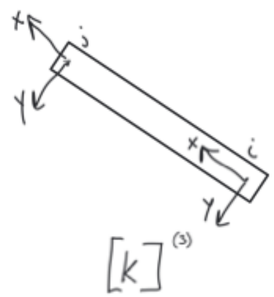
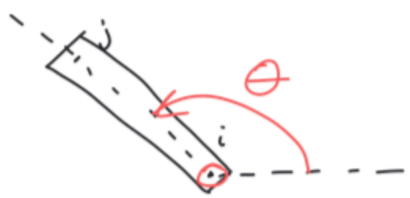
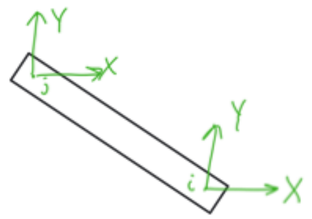
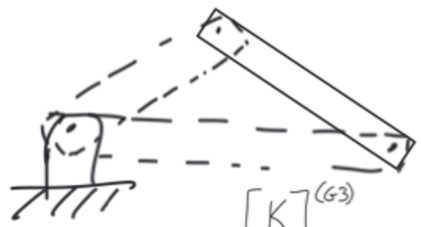


$[k]^{(3)}$





$[K]^{(3)}$



$[K]^{(G3)}$

$f_i = k(u_{ix} - u_{jx})$

$f_j = k(u_{jx} - u_{ix})$

	i_x	i_y	j_x	j_y	
	k	0	$-k$	0	u_{ix}
	0	0	0	0	u_{iy}
	$-k$	0	k	0	u_{jx}
	0	0	0	0	u_{jy}

Coor. Sys: Local
Form: Element

$[K] = [T][k][T]^{-1}$

where...

$$\begin{bmatrix} \cos\theta & \sin\theta & 0 & 0 \\ -\sin\theta & \cos\theta & 0 & 0 \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \end{bmatrix}$$

	i_x	i_y	j_x	j_y	
	$\cos^2\theta$	$\sin\theta\cos\theta$	$-\cos^2\theta$	$-\sin\theta\cos\theta$	U_{ix}
	$\sin\theta\cos\theta$	$\sin^2\theta$	$\cdot$	$\cdot$	U_{iy}
	$\cdot$	$\cdot$	$\cdot$	$\cdot$	U_{jx}
	$\cdot$	$\cdot$	$\cdot$	$\cdot$	U_{jy}

Coor. Sys: Global
Form: Element

$[K]^G = [Trans\#]^T [K] [Trans\#]$

where...

$[Trans\#] =$

	i_x	i_y	j_x	j_y	
	1	0	0	0	U_{ix}
	0	1	0	0	U_{iy}
	0	0	1	0	U_{jx}
	0	0	0	1	U_{jy}
	$\cdot$	$\cdot$	$\cdot$	$\cdot$	$\vdots$

put in rows of node i

all other rows are 0

put in rows of node j

$U_{1x}\ U_{1y}\ U_{2x}\ U_{2y}\ U\ \cdots$

Square Matrix with dimensions of (total number of nodes) $\times 2$		U_{1x}
		U_{1y}
		U_{2x}
		U_{2y}
		U
		$\vdots$

x, y components

Coor. Sys': Global
Form: System