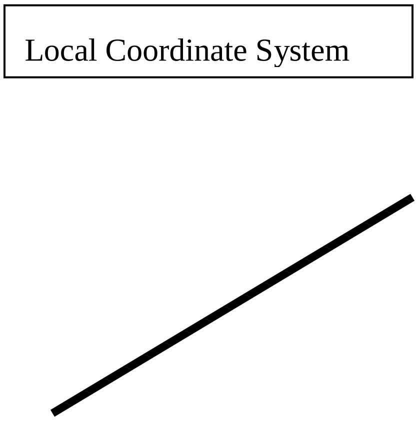
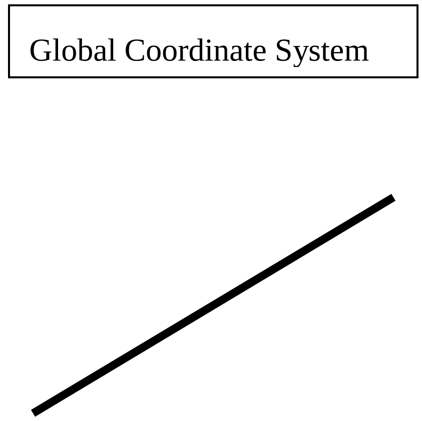
<u>Member Force-Deformation Relationship in Local C.S.</u>

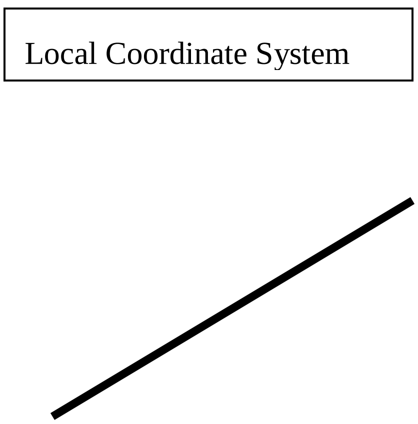
$$\mathbf{q = k' \, d}$$

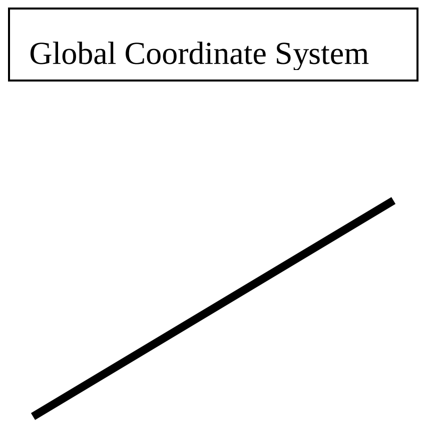
$$\begin{Bmatrix} q_{Nx'} \\ q_{Ny'} \\ m_{Nz'} \\ q_{Fx'} \\ q_{Fy'} \\ m_{Fz'} \end{Bmatrix} = \begin{bmatrix} \frac{AE}{L} & 0 & 0 & -\frac{AE}{L} & 0 & 0 \\ 0 & \frac{12EI}{L^3} & \frac{6EI}{L^2} & 0 & -\frac{12EI}{L^3} & \frac{6EI}{L^2} \\ 0 & \frac{6EI}{L^2} & \frac{4EI}{L} & 0 & -\frac{6EI}{L^2} & \frac{2EI}{L} \\ -\frac{AE}{L} & 0 & 0 & \frac{AE}{L} & 0 & 0 \\ 0 & -\frac{12EI}{L^3} & -\frac{6EI}{L^2} & 0 & \frac{12EI}{L^3} & -\frac{6EI}{L^2} \\ 0 & \frac{6EI}{L^2} & \frac{2EI}{L} & 0 & -\frac{6EI}{L^2} & \frac{4EI}{L} \end{bmatrix} \begin{Bmatrix} d_{Nx'} \\ d_{Ny'} \\ \theta_{Nz'} \\ d_{Fx'} \\ d_{Fy'} \\ \theta_{Fz'} \end{Bmatrix}$$

Local and Global
CS









Member Force-Deformation Relationship: Global C.S.

	$\mathbf{q = k' \, d}$
But	$\mathbf{d = TD}$
So	$\mathbf{q = k'TD}$
We want	$\mathbf{Q = T^t q}$
Therefore	$\mathbf{Q = T^t k'TD}$
and	$\mathbf{k = T^t k'T}$