11-5-14 BCL

$$\underline{\underline{F}} = \frac{\partial x_i}{\partial X_j} \underline{e}_i \otimes \underline{E}_j = \cancel{x_{i,j}\, \underline{e}_i \otimes \underline{E}_j}$$

$$= \overset{e-E}{F_{ij}}\, \underline{e}_i \otimes \underline{E}_j$$

$$\underline{\underline{F}}^T = \overset{e-E}{F_{ji}}\, \underline{e}_i \otimes \underline{E}_j = \overset{e-E}{F_{ij}}\, \underline{e}_j \otimes \underline{E}_i$$

$$\underline{\underline{U}}^2 = \underline{\underline{F}}^T \cdot \underline{\underline{F}} = \overset{e-E}{F_{ij}}\, \underline{e}_j \otimes \underline{E}_i \cdot \overset{e-E}{F_{kl}}\, \underline{e}_k \otimes \underline{E}_l = \overset{e-E}{F_{ij}}\, \overset{e-E}{F_{ik}}\, \underline{e}_j \otimes \underline{E}_k$$

Say: $\underline{r} = \alpha X_1 \underline{e}_1 + \beta X_2 \underline{e}_2 + X_3 \underline{e}_3 \Rightarrow$

$$d\underline{r} = \underline{\underline{F}} \cdot d\underline{R} \rightarrow \underline{\underline{F}} = \overset{e-E}{F_{ij}}\, \underline{e}_i \otimes \underline{E}_j \Rightarrow \overset{e-E}{\begin{bmatrix} \alpha & 0 & 0 \\ 0 & \beta & 0 \\ 0 & 0 & 1 \end{bmatrix}}$$

$$\underline{\underline{F}}^T = \overset{e-E}{F_{ij}}\, \underline{e}_j \otimes \underline{E}_i \Rightarrow \overset{e-E}{\begin{bmatrix} \alpha & 0 & 0 \\ 0 & \beta & 0 \\ 0 & 0 & 1 \end{bmatrix}}$$

$$\underline{\underline{U}}^2 = \underline{\underline{F}}^T \cdot \underline{\underline{F}} = \overset{e-E}{F_{ij}}\, \overset{e-E}{F_{ik}}\, \underline{e}_j \otimes \underline{E}_k = \overset{e-E}{U^2_{jk}}\, \underline{e}_j \otimes \underline{E}_k =$$

$$\overset{\Sigma \longrightarrow}{\begin{bmatrix} \alpha & 0 & 0 \\ 0 & \beta & 0 \\ 0 & 0 & 1 \end{bmatrix}} \quad \overset{\Sigma \longrightarrow}{\begin{bmatrix} \alpha & 0 & 0 \\ 0 & \beta & 0 \\ 0 & 0 & 1 \end{bmatrix}} \Rightarrow \begin{array}{ccc} j=1,\ k=1 & j=1,\ k=2 & \\ \end{array} \begin{bmatrix} \alpha^2 & 0 & 0 \\ 0 & \beta^2 & 0 \\ 0 & 0 & 1^2 \end{bmatrix} \Rightarrow \underline{\underline{U}}^2,$$

this is what I did

Σ on the "i" index