

3. show  $\frac{\partial (\sigma_1 + \sigma_2 + \sigma_3)}{\partial \underline{F}} = \underline{R}$

$$\begin{aligned}
 \left( \frac{\partial (\sigma_1 + \sigma_2 + \sigma_3)}{\partial \underline{F}} \right)_{ij} &= \frac{\partial \sigma_{kk}}{\partial F_{ij}} \\
 &= \frac{\partial (U_{km}^T F_{mn} V_{nk})}{\partial F_{ij}} \\
 &= U_{km}^T \delta_{mi} \delta_{nj} V_{nk} \\
 &= U_{ki}^T V_{jk} \\
 &= U_{ik} V_{kj}^T \\
 &= (\underline{U} \underline{V}^T)_{ij} \\
 &= R_{ij}
 \end{aligned}$$