

Here we demonstrate that if  $E$  and  $J$  both transform like 1<sup>st</sup> rank tensors, then  $\tau_{ij}$  will transform like a second rank tensor

$$\begin{aligned}
 J'_i &= a_{ij} J_j = a_{ij} (\tau_{jk} E_k) = T_{ij} - 2^{\text{nd}} \text{ rank tensor} \\
 &= a_{ij} \tau_{jk} (a_{nk} E'_n) = a_{ij} a_{nk} \tau_{jk} E'_n \\
 J'_i &= \tau'_{in} E'_n
 \end{aligned}$$

$T'_{ip} = a_{ij} a_{pq} T_{jq}$