

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

$$\begin{aligned}
 J'_i &= a_{ij} J_j = a_{ij} \tau_{jk} E_k = \\
 &= a_{ij} \tau_{jk} \underbrace{a_{nk} E'_n}_{E_k} = \underbrace{a_{ij} a_{nk} \tau_{jk}}_{\tau'_{in}} E'_n
 \end{aligned}$$

$T_{ij}$  - 2<sup>nd</sup> rank tensor  
 $T'_{ip} = a_{ij} a_{pq} T_{jq}$

$J'_i = \tau'_{in} E'_n$