Summary of 3D stress resolution
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Thanks to Don Ragan and Olaf Zielke

Given $S$ principal stress tensor with orientation $x'y'z'$

Rotate to N-S, E-W components

$$R = \begin{bmatrix} l & l' & l'' \\ m & m' & m'' \\ n & n' & n'' \end{bmatrix}$$

where $l = x \times x'$

$$l' = x \times y'$$

$$l'' = x \times z'$$

$$S' = R^T SR$$

And given plane with normal vector direction cosines $N$

Traction $T = S' \ast N$ (row and column multiplication)

$T = \sqrt{T(1)^2 + T(2)^2 + T(3)^2}$ traction magnitude

$\sigma_n = T \cdot N$ dot product for normal traction magnitude

$B = T \times N$ cross product for null vector

$B = \sqrt{B(1)^2 + B(2)^2 + B(3)^2}$ $B$ magnitude

$B_{normalized} = B / B$ normalize for orientation if necessary

$T_s = N \times B$ cross product for shear traction vector

$\tau = \sqrt{T_s(1)^2 + T_s(2)^2 + T_s(3)^2}$ shear traction magnitude

$T_{s normalized} = T_s / \tau$ normalize for shear traction orientation

Coulomb failure function: $\Delta \sigma_f = \Delta \tau - (\mu - P) \Delta \sigma_n$