ולעשת יותר צלחים ומסוגלים, כ. אוlando סנתר.

(!$c_a \neq 0$)

$$\tan \theta = \frac{|c_a|}{|a|} = \frac{|c|/|a|}{|a|} = \frac{|c|}{|a|} \in \Theta$$

$$b = a + c_a$$

$$c_a = |c_a| \sin \alpha = \frac{|c|}{|a|}$$

$$\sin \alpha = 90^\circ$$

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\[
\begin{bmatrix}
0 & \mathbf{w}_{12} & \mathbf{w}_{13} \\
-\mathbf{w}_{21} & 0 & \mathbf{w}_{23} \\
-\mathbf{w}_{31} & -\mathbf{w}_{32} & 0
\end{bmatrix}
\begin{bmatrix}
\mathbf{U}_1 \\
\mathbf{U}_2 \\
\mathbf{U}_3
\end{bmatrix} =
\begin{bmatrix}
\mathbf{w}_{02} \\
\mathbf{w}_{03}
\end{bmatrix}
\]

\[
\mathbf{U}^\mathrm{T} = 
\begin{bmatrix}
\mathbf{U}_1 \\
\mathbf{U}_2 \\
\mathbf{U}_3
\end{bmatrix}
\]

\[
\begin{bmatrix}
0 & \mathbf{w}_{12} & \mathbf{w}_{13} \\
-\mathbf{w}_{21} & 0 & \mathbf{w}_{23} \\
-\mathbf{w}_{31} & -\mathbf{w}_{32} & 0
\end{bmatrix}
\begin{bmatrix}
\mathbf{V}_1 \\
\mathbf{V}_2 \\
\mathbf{V}_3
\end{bmatrix} =
\begin{bmatrix}
\mathbf{w}_{02} (\mathbf{U}_1 - \mathbf{w}_{12} \mathbf{U}_2) \\
-\mathbf{w}_{03} (\mathbf{U}_1 + \mathbf{w}_{13} \mathbf{U}_2) \\
-\mathbf{w}_{03} (\mathbf{U}_1 - \mathbf{w}_{13} \mathbf{U}_2)
\end{bmatrix}
\]

\[
\mathbf{W} = \mathbf{U} \times \mathbf{V} = (\mathbf{w}_{02}, \mathbf{w}_{03}, \mathbf{w}_{03}) \times (\mathbf{V}_1, \mathbf{V}_2, \mathbf{V}_3) =
\]

\[
\begin{align*}
\mathbf{w}_{ij} &= \mathbf{V}_i \times \mathbf{w}_{02} \mathbf{V}_j - \mathbf{w}_{03} \mathbf{V}_i \times \mathbf{V}_j + \mathbf{w}_{12} \mathbf{V}_i \mathbf{V}_j - \mathbf{w}_{13} \mathbf{V}_i \mathbf{V}_j \\
&= (\mathbf{w}_{02} \mathbf{V}_j - \mathbf{w}_{03} \mathbf{V}_i)^2 + (\mathbf{w}_{12} \mathbf{V}_i - \mathbf{w}_{13} \mathbf{V}_i \mathbf{V}_j) + (\mathbf{w}_{12} \mathbf{V}_j - \mathbf{w}_{13} \mathbf{V}_j \mathbf{V}_i) \mathbf{V}_i
\end{align*}
\]

\[
\begin{bmatrix}
\mathbf{w}_{02} \mathbf{U}_i - \mathbf{w}_{03} \mathbf{U}_j \\
\mathbf{w}_{12} \mathbf{U}_i - \mathbf{w}_{13} \mathbf{U}_i \\
-\mathbf{w}_{12} \mathbf{U}_j - \mathbf{w}_{13} \mathbf{U}_j
\end{bmatrix}
\]

\[
\mathbf{W} = \mathbf{U} \times \mathbf{V}
\]

\[
\| \mathbf{V}_i \|^2 = \mathbf{V}_i \cdot \mathbf{V}_i
\]

\[
\mathbf{E}(\mathbf{V}_i) = \mathbf{w}_{02} \mathbf{U}_i + \mathbf{w}_{03} \mathbf{U}_j + \mathbf{w}_{12} \mathbf{U}_i + \mathbf{w}_{13} \mathbf{U}_j + \mathbf{w}_{21} \mathbf{U}_i + \mathbf{w}_{23} \mathbf{U}_j + \mathbf{w}_{31} \mathbf{U}_i + \mathbf{w}_{32} \mathbf{U}_j
\]

\[
\mathbf{E}(\mathbf{V}_i) = \mathbf{0}
\]
\[ W_{ij} = W_{12} + W_{13} + W_{21} + W_{23} + W_{31} + W_{32} \]

\[ \text{for } \forall i, j \text{ with } i < j \text{ or } i > j \]

\[ W_{ij} = -W_{ji} \]

\[ \left[ \begin{array}{c}
W_{ij} = \frac{1}{2} \left( W_{12}^2 + W_{13}^2 + W_{21}^2 \right)
\end{array} \right] \]

\[ W_{ij} = -W_{ji} \quad \text{and} \quad W_{ij} = 2 \left| W_{ij} \right| \]

\[ E_{ij} = \frac{P_{ix} E_{x} x_{iy}}{P_{ij}} \]

\[ P_{ij} E_{ij} = P_{ij} \left( E_{x} x_{iy} \right) = \delta_{x} x_{iy} E_{x} = E_{x} x_{iy} \]

\[ P_{ij} E_{ij} P_{x} = E_{m} P_{x} x_{iy} = E_{m} \delta_{x} x_{iy} = E_{m} \]

\[ \text{Prop. Eq.} \]

\[ \text{Prop. Eq.} \]

\[ e' = p \cdot p' \]

\[ e = \begin{bmatrix} e_{11} & e_{12} \\
2e_{11} & e_{22} \end{bmatrix} \quad P = \begin{bmatrix} \cos \theta & \sin \theta \\
-\sin \theta & \cos \theta \end{bmatrix} \quad p = \begin{bmatrix} \cos \theta & -\sin \theta \\
\sin \theta & \cos \theta \end{bmatrix} \]

\[ \left[ \begin{array}{c}
\text{Eq. 11}
\end{array} \right] \]

\[ \left[ \begin{array}{c}
\text{Eq. 12}
\end{array} \right] \]
\[ \cos^2 \Theta \varepsilon_{11} + 2 \cos \Theta \sin \Theta \varepsilon_{11} + \sin^2 \Theta \varepsilon_{22} \]

\[ \varepsilon_{11} = \varepsilon_{31} (\cos^2 \Theta - \sin^2 \Theta) + (\varepsilon_{33} - \varepsilon_{11}) \sin \Theta \cos \Theta \]

\[ \varepsilon_{12} = \varepsilon_{32} (\cos^2 \Theta - \sin^2 \Theta) + (\varepsilon_{33} - \varepsilon_{11}) \sin \Theta \cos \Theta \]

\[ \varepsilon_{13} = \cos^2 \Theta \varepsilon_{13} + \sin^2 \Theta \varepsilon_{11} - 2 \varepsilon_{11} \cos \Theta \sin \Theta \]

\[ \varepsilon_{ij} = \frac{1}{2} \left( u_{ij} + u_{ji} \right) \]

\[ \varepsilon_{11} = \frac{1}{2} \left( u_{11} + u_{11} \right) = \beta \]

\[ \varepsilon_{12} = \frac{1}{2} \left( u_{12} + u_{21} \right) = \frac{A}{2B} \left( \beta \right) \]

\[ \varepsilon_{13} = 0 \]

\[ \varepsilon_{22} = \frac{1}{2} \left( u_{22} + u_{22} \right) = -\frac{1}{B} \beta \]

\[ \varepsilon_{23} = 0 \]

\[ \varepsilon_{33} = 0 \]

\[ \varepsilon = \begin{bmatrix} \beta & \frac{A}{2B} \beta & 0 \\ \frac{A}{2B} \beta & -\frac{1}{B} \beta & 0 \\ 0 & 0 & 0 \end{bmatrix} \]

\[ \varepsilon_{mn} = n_{ij} \varepsilon_{ij} \]
\[ E_{mn} = n^{(m)} \cdot \epsilon_{n}^{(n)} = 0.5556 \text{ MPa} \]

\[ E_{mn} = n^{(m)} \cdot \epsilon_{n}^{(n)} = -0.1115 \text{ MPa} \]

\[ E_{mn} = n^{(m)} \cdot \epsilon_{n}^{(n)} = -0.1115 \text{ MPa} \]

\[ E_{mn} = -0.4082 \epsilon_{3}^{(n)} = 0.5556 \text{ MPa} \]

\[ \sqrt[3]{(1,1,1) \times (1,0,-1)} \sqrt[3]{1} = (-0.4082, 0.8165, 0.4082) \]

\[ \begin{bmatrix}
-0.4082 & 0.8165 & -0.4082 \\
-0.4082 & 0.8165 & -0.4082
\end{bmatrix}
\]

\[ \begin{bmatrix}
\frac{1}{\sqrt[3]{1}} & \frac{1}{\sqrt[3]{1}} & \frac{1}{\sqrt[3]{1}} \\
\frac{1}{\sqrt[3]{1}} & 0 & \frac{1}{\sqrt[3]{1}} \\
\frac{1}{\sqrt[3]{1}} & 0 & \frac{1}{\sqrt[3]{1}}
\end{bmatrix} = \alpha
\]

\[ \begin{bmatrix}
0.5556 & 0.6124 & -0.3745 \\
0.6124 & 0.5 & 0 \\
-0.3745 & 0 & -0.3889
\end{bmatrix} \]

\[ \varepsilon = \frac{1}{\alpha} \varepsilon^T = \begin{bmatrix}
0.5556 & 0.6124 & -0.3745 \\
0.6124 & 0.5 & 0 \\
-0.3745 & 0 & -0.3889
\end{bmatrix} \]

\[ \frac{2 \varepsilon_{12}}{\varepsilon_{0}} = \frac{2 \varepsilon_{12}}{2 \varepsilon_{0}} \]

\[ \frac{\varepsilon_{0}}{\varepsilon_{0}} = \frac{1}{\sqrt[3]{1}} \begin{bmatrix}
+1 \\
0
\end{bmatrix} \]

\[ n = \frac{1}{\sqrt[3]{1}} \begin{bmatrix}
+1 \\
0
\end{bmatrix} \]

\[ \Delta \max = \max \left\{ |\varepsilon_{1} - \varepsilon_{2}|, |\varepsilon_{2} - \varepsilon_{3}|, |\varepsilon_{3} - \varepsilon_{1}| \right\} = |\varepsilon_{3} - \varepsilon_{1}| = 1.666 \text{ MPa} \]

\[ n = \frac{1}{\sqrt[3]{1}} \begin{bmatrix}
+1 \\
0
\end{bmatrix} \]
\[ I_3 = -\frac{2}{3} j_0 \]
\[ I_3 = -\frac{1}{12} j_0 \]
\[ I_3 = 0 \]

\[ \sum \frac{3}{2} e \frac{e^2 + \frac{2}{3} e^4 + \frac{1}{3} e^6}{e^2 + \frac{2}{3} e^4 - \frac{1}{3} e^6} = 0 \]

\[ e_1 = 1.1664 j_0, \quad e_2 = 0, \quad e_3 = -0.5 j_0 \]

\[ \left( \mathbf{I}^T - \mathbf{e}_3 \mathbf{e}_3^T \right) \mathbf{u} = 0 \]

\[ \mathbf{u} = \begin{bmatrix} -0.4503 \\ -0.6 + 08 \\ 0.1591 \end{bmatrix} \]

\[ \mathbf{v} = \begin{bmatrix} -0.5 + 44 \\ 0.70 + 1 \\ 0.4082 \end{bmatrix} \]

\[ \mathbf{w} = \begin{bmatrix} 0.3651 \\ 0.2236 \\ 0.9097 \end{bmatrix} \]