- Für die 8 Ebenen mit den Normalen $\vec{n} = (n_1, n_2, n_3)^T$: $n_i^2 = 1/3$, $i = 1, 2, 3$

des Oktaeders gilt wegen (12)

$$\sigma_{oct} = \sigma_n = \sigma_i n_i^2 = \frac{1}{3}(\sigma_1 + \sigma_2 + \sigma_3) = p$$

$$\tau_{oct} = \tau_n = (\sigma_i n_i^2 - \sigma_n^2)^{1/2} =$$

$$= \left(\frac{1}{3}\sigma_i \sigma_i - \frac{1}{9}(\sigma_1 + \sigma_2 + \sigma_3)^2\right)^{1/2}$$

$$= \frac{1}{3}\left(3(\sigma_1^2 + \sigma_2^2 + \sigma_3^2) - (\sigma_1^2 + \sigma_2^2 + \sigma_3^2 + 2\sigma_1\sigma_2 + 2\sigma_2\sigma_3 + 2\sigma_1\sigma_3)\right)^{1/2}$$

$$= \frac{1}{3}\left(2(\sigma_1^2 + \sigma_2^2 + \sigma_3^2) - 2(\sigma_1\sigma_2 + \sigma_2\sigma_3 + \sigma_1\sigma_3)\right)^{1/2}$$

$$= \frac{1}{3}\left((\sigma_1 - \sigma_2)^2 + (\sigma_2 - \sigma_3)^2 + (\sigma_3 - \sigma_1)^2\right)^{1/2}$$

$$= \sqrt{\frac{6}{9} \cdot \frac{1}{6}\left[(\sigma_1 - \sigma_2)^2 + (\sigma_2 - \sigma_3)^2 + (\sigma_3 - \sigma_1)^2\right]}$$

$$= \sqrt{\frac{2}{3}(-I_2(S))} = \sqrt{\frac{2}{3} J_2(\sigma)}$$

$$= \sqrt{\frac{2}{3}}\, \tau_I .$$