$$\Theta = \frac{d\tau}{d\gamma} = \frac{d\left(\tau + \alpha \cdot G \cdot b \cdot \sqrt{\rho_d}\right)}{d\gamma} = \frac{1}{2} \cdot \alpha \cdot G \cdot b \cdot \frac{1}{\sqrt{\rho_d}} \cdot \frac{d\rho_d}{d\gamma}$$

$$\Theta = \frac{1}{2} \cdot \alpha \cdot G \cdot \frac{1}{\sqrt{\rho_d}} \cdot \left(\frac{\sqrt{\rho_d}}{K} - 2 \cdot \beta \cdot \rho_d \cdot R\right) = \frac{1}{2} \cdot \frac{\alpha \cdot G}{K} \cdot \left(1 - \frac{\sqrt{\rho_d}}{\sqrt{\rho_d^{sat}}}\right)$$

$$\Theta = \Theta_0 \cdot \left(1 - \frac{\sqrt{\rho_d}}{\sqrt{\rho_d^{sat}}}\right) = \Theta_0 \cdot \left(1 - \frac{\sigma}{\sigma_{sat}}\right)$$

(Eq. 6.42)

Here Θ_0 is the initial strain-hardening rate:

$$\Theta_0 = \frac{\alpha \cdot G}{2 \cdot K}$$

(Eq. 6.43)

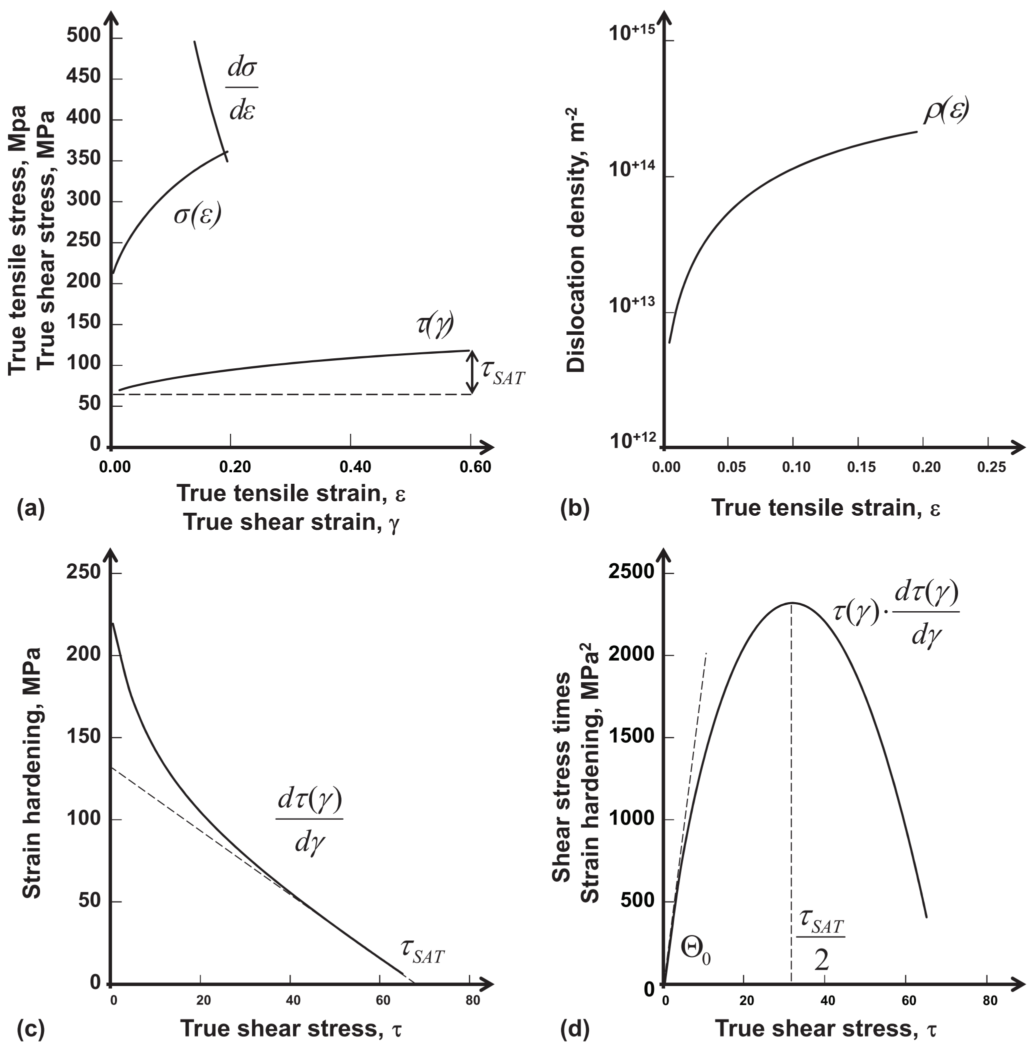

Fig. 6.16 (a) Calculated σ(ε) and τ(γ) stress-strain curves for Ti-IF steel. (b) Dislocation density evolution. (c) $\frac{d\tau(\gamma)}{d\gamma}$ curve. (d) $\tau(\gamma) \cdot \frac{d\tau(\gamma)}{d\gamma}$ curve.