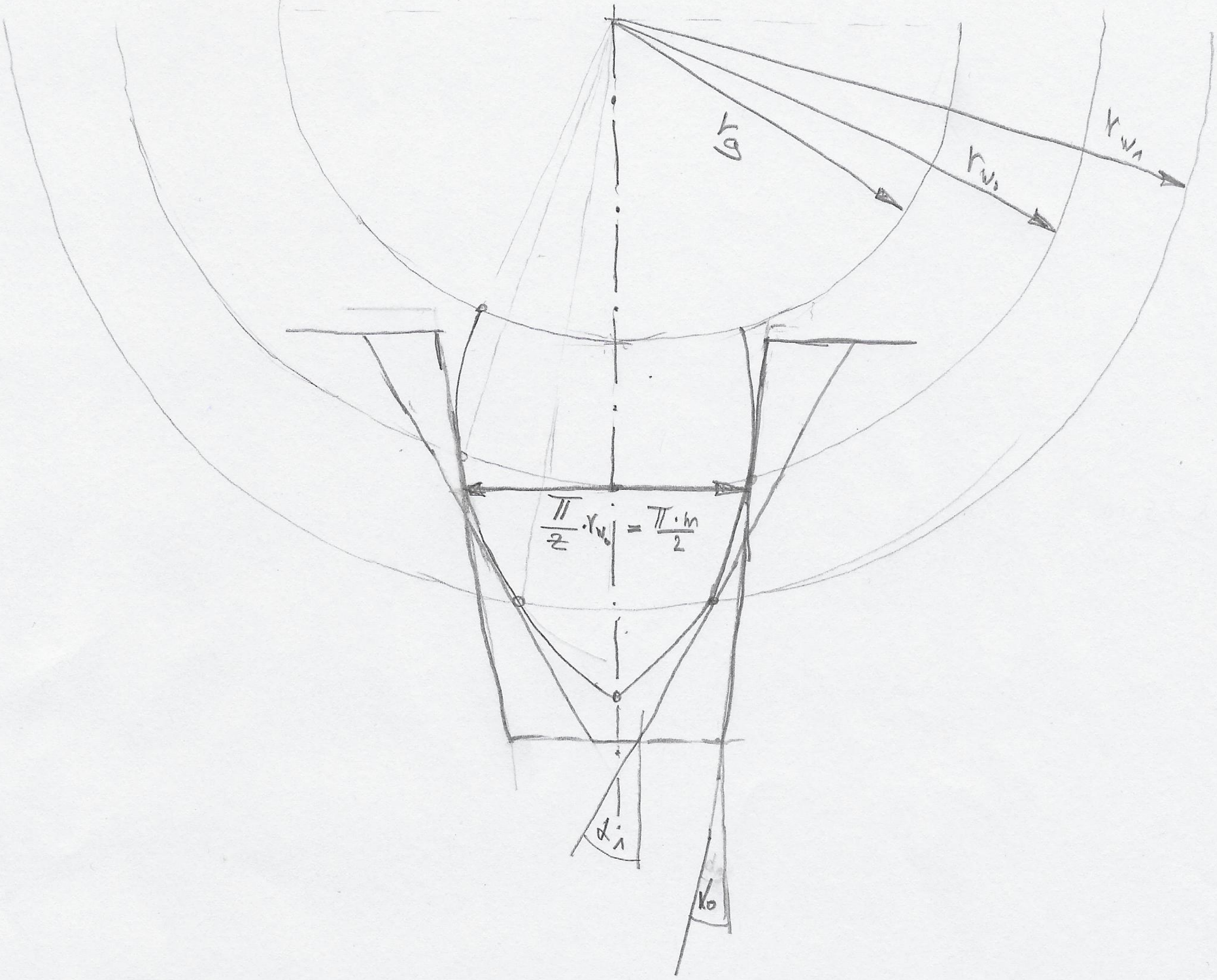
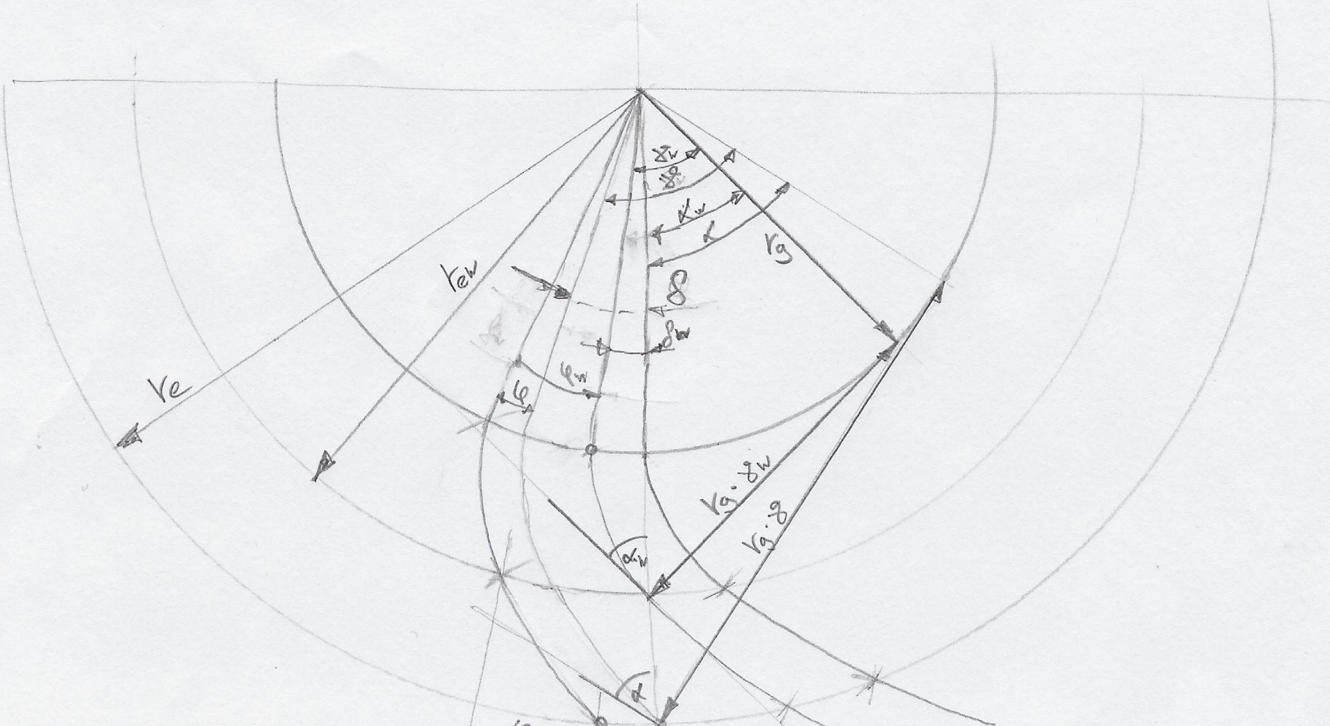


r_g
r_{w_0}
r_{w_1}
$\frac{\pi}{z} \cdot r_{w_0} = \frac{\pi \cdot m}{2}$
α_1
α_0



r_g
r_{ew}
r_e
α_w
α
δ
δ_w
φ
φ_w
$r_g \cdot \delta_w$
$r_g \cdot \delta$

ges.: $\alpha(r_e)$, $\varphi(r_e)$

(1) $\delta = \gamma - \alpha$

(2) $\varphi = \check{\varphi}_w + \delta_w - \delta$ $\qquad \varphi_w = \frac{\pi}{z}$

(3) $\delta_w = \gamma_w - \check{\alpha}_w$

$$r_g^2 \cdot \gamma_w^2 + r_g^2 = r_e^2 \longrightarrow r_g \cdot \sqrt{\gamma_w^2 + 1} = r_{ew} \qquad r_{ew} \cdot \cos(\alpha_w) = r_g$$

$$r_{ew} \cdot \cos(\alpha_w) \cdot \sqrt{\gamma_w^2 + 1} = r_{ew}$$

$$\cos(\alpha_w) = \frac{1}{\sqrt{\gamma_w^2 + 1}}$$

$$\gamma_w^2 + 1 = \frac{1}{\cos^2(\alpha_w)}$$

(4) $$\gamma_w = \sqrt{\frac{1 - \cos^2(\alpha_w)}{\cos^2(\alpha_w)}} = \sqrt{\frac{\sin^2(\alpha_w)}{\cos^2(\alpha_w)}} = \tan(\alpha_w)$$

(3)(4): $\delta_w = \tan(\alpha_w) - \alpha_w$

Selbes gilt für α, γ, δ

$$\boxed{\delta = \tan(\alpha) - \alpha}$$

$$\varphi = \frac{\pi}{z} + \tan(\alpha_w) - \alpha_w - \tan(\alpha) + \alpha =$$

$$\boxed{\varphi = \frac{\pi}{z} + (\alpha - \alpha_w) + (\tan(\alpha_w) - \tan(\alpha))}$$

$$\boxed{\alpha(r) = \arccos\left[\frac{r_0}{r_e} \cos(\alpha_w)\right]}$$

$$\boxed{r_e(r) = \frac{r_{e0} \cdot r}{r_0}}$$

r vorgeben (mehrere Stützstellen)

↳ $r_e(r)$ berechnen

↳ $\alpha(r)$ berechnen

↳ φ berechnen

x_1:

$$\frac{a}{\sin\alpha} = \frac{b}{\cos\alpha} \qquad a = b \cdot \tan\alpha$$

$$b = y_1 - (\overbrace{r_{ew} + r_e \cdot \cos(\varphi)}^{\Delta y})$$

$$a = \tan(\alpha) \cdot b$$

$$|x_1| = \overbrace{r_e \cdot \sin(\varphi)}^{x_0} + a$$

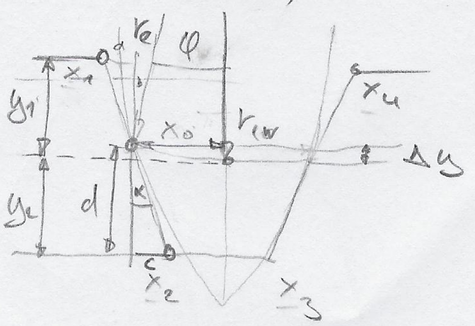
$$d = y_2 + \Delta y$$

$$c = \tan(\alpha) \cdot d$$

$$|x_2| = x_0 - c$$

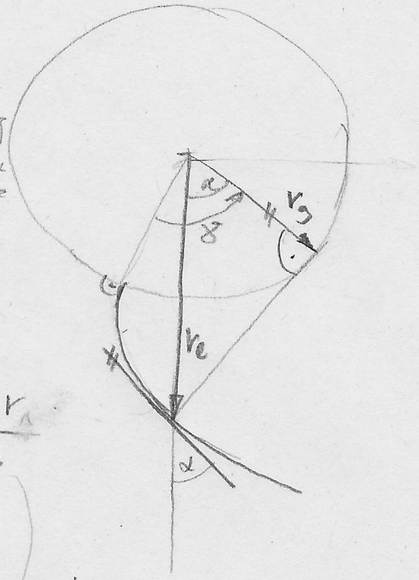
$$\underline{x}_1 = \begin{bmatrix} -x_1 \\ 0 \end{bmatrix}$$

$$\underline{x}_2 = \begin{bmatrix} -x_2 \\ -y_1 - y_2 \end{bmatrix}$$



① $r_e = r_g \sqrt{\frac{1}{\cos^2(\alpha)}}$ $\boxed{r_e = \frac{r_g}{\cos(\alpha)}}$

Evolventen ZR z_1, m



$\gamma = \sqrt{\frac{1}{\cos^2(\alpha)} - 1}$ $\gamma = \frac{\sqrt{1-\cos^2\alpha}}{\cos(\alpha)}$

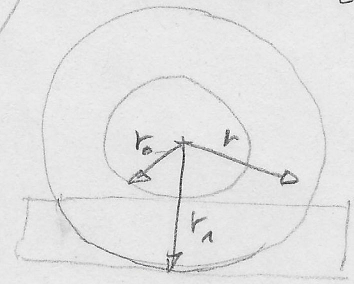
$\gamma = \frac{\sqrt{\cos^2\alpha + \sin^2\alpha - \cos^2\alpha}}{\cos\alpha} =$

$\frac{m_e z_1}{2} = r_e$ $\boxed{\gamma = \tan(\alpha)}$

$\frac{r_{e0}}{r_e} = \frac{r_0}{r}$ $*_1$ $\frac{r_{e0}}{r_0} = \frac{r_e}{r} \rightarrow r_e = \frac{r_{e0} \cdot r}{r_0}$

$r_{e0} = r_g \sqrt{\frac{1}{\cos^2(\alpha_0)}} = \frac{m \cdot z_1}{2}$

Kronen ZR $z_1, m - m_1$



$r_g = r_{e0} \sqrt{\cos^2(\alpha_0)}$

$= r_g = r_e \sqrt{\cos^2(\alpha)}$

$r_e \cdot \sqrt{\cos^2(\alpha)} = r_{e0} \sqrt{\cos^2(\alpha_0)}$

$\cos(\alpha) = \left(\frac{r_{e0}}{r_e}\right) \cdot \cos(\alpha_0)$

$\alpha(r_e) = \arccos\left[\left(\frac{r_{e0}}{r_e}\right) \cdot \cos(\alpha_0)\right]$

$\alpha^{*_1}(r) = \arccos\left[\left(\frac{r_0}{r}\right) \cdot \cos(\alpha_0)\right]$