1 Vorwärtsproblem

$$h_r = \sqrt{l_e^2 + h_m^2 - 2l_e h_m \cdot cos(\phi)}$$

$$\alpha = arcsin\left(l_e \cdot \frac{sin(\phi)}{h_r}\right)$$

$$\beta = \pi - \alpha - \psi$$

$$h = sin(\phi) \cdot \frac{h_b}{sin(\beta)}$$

$$\gamma = arcsin(\frac{l_r}{h_r})$$

$$\delta = \pi - \beta - \gamma$$

$$b_{bottom} = \frac{sin(\gamma)}{sin(\delta)} \cdot h$$

$$\epsilon = \pi - \beta$$

$$\zeta = \pi - \epsilon - \gamma$$

$$b_{top} = \frac{sin(\epsilon)}{sin(\zeta)} \cdot h$$

$$b = b_{top} + b_{bottom}$$

$$b(l_r, l_e, h_m, h_b, \phi, \psi) =$$

$$\left(\frac{\frac{l_r}{\sqrt{l_e^2 + h_m^2 - 2*l_e*h_m*cos(\phi)}}}{sin(-arcsin(\frac{l_r}{\sqrt{l_e^2 + h_m^2 - 2*l_e*h_m*cos(\phi)}}) + \pi - arcsin(\frac{l_e*sin(\phi)}{\sqrt{l_e^2 + h_m^2 - 2*l_e*h_m*cos(\phi)}}) - \psi)}\right.$$

$$\left. + \frac{\frac{l_e*sin(\phi)}{hr} + \psi}{sin(-arcsin(\frac{l_r}{\sqrt{l_e^2 + h_m^2 - 2*l_e*h_m*cos(\phi)}}) + arcsin(\frac{l_e*sin(\phi)}{\sqrt{l_e^2 + h_m^2 - 2*l_e*h_m*cos(\phi)}}) + \psi)}\right)$$

$$\cdot \left(\frac{sin(\phi) * h_b}{sin(\pi - arcsin(\frac{l_e*sin(\phi)}{\sqrt{l_e^2 + h_m^2 - 2*l_e*h_m*cos(\phi)}}) - \psi)}\right)$$