$$r_a = 0 \quad , \quad r_b \neq 0 = r$$

$$u_a \qquad\qquad u_b$$

$$r'^{\alpha} = \left(r^{\alpha} - (u_a \cdot r)\, u_a^{\alpha}\right)$$

$$v_b^{\alpha} = u_b^{\alpha} - (u_b \cdot u_a)\, u_a^{\alpha}$$

$$r''^{\alpha} = r'^{\alpha} - v_b^{\alpha}\left(\frac{v_b \cdot r'}{v_b^2}\right)$$

$$v_b^2 = 1 - (u_b \cdot u_a)^2$$

$$r''^2 = r'^2 - \frac{(v_b \cdot r')^2}{v_b^2}$$

$$= r^2 - (u_a \cdot r)^2 - \frac{\left[u_b \cdot r - (u_a \cdot r)(u_a \cdot u_b)\right]^2}{1 - (u_a \cdot u_b)^2}$$

$$= r^2 - \frac{(u_b \cdot r)^2 + (u_a \cdot r)^2 \cancel{- (u_a \cdot r)^2 (u_a \cdot u_b)^2} - 2(u_a \cdot u_b)(u_a \cdot r)(u_b \cdot r) \cancel{+ (u_a \cdot r)^2 (u_a \cdot u_b)^2}}{1 - (u_a \cdot u_b)^2}$$

$$= r^2 - \frac{(u_a \cdot r)^2 + (u_b \cdot r)^2 - 2(u_a \cdot u_b)(u_a \cdot r)(u_b \cdot r)}{1 - (u_a \cdot u_b)^2}$$

$$b = \sqrt{-r^2 + \frac{(u_a \cdot r)^2 + (u_b \cdot r)^2 - 2(u_a \cdot u_b)(u_a \cdot r)(u_b \cdot r)}{1 - (u_a \cdot u_b)^2}}$$