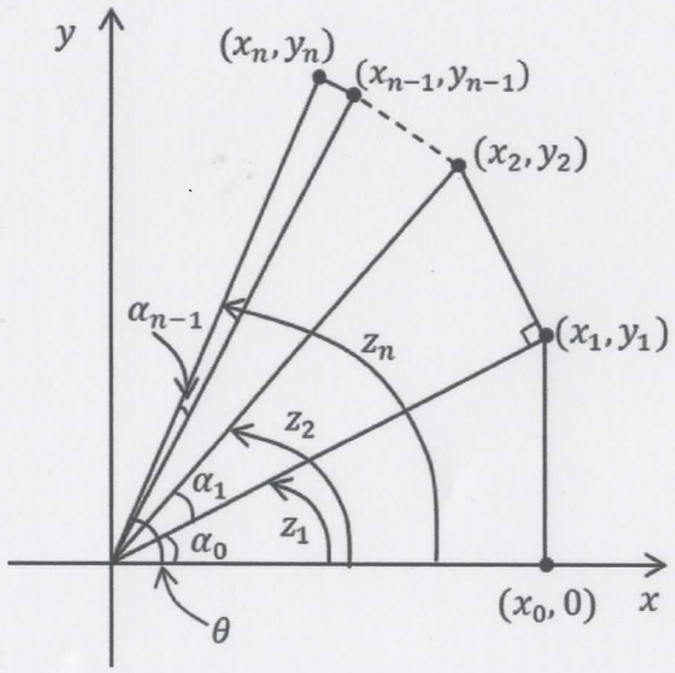
✡ CORDIC 法による cosθ, sinθ 計算 その1



◎ $\begin{pmatrix} x_0 \\ y_0=0 \end{pmatrix} \to \begin{pmatrix} x_1 \\ y_1 \end{pmatrix} \cdots \to \begin{pmatrix} x_i \\ y_i \end{pmatrix} \to \begin{pmatrix} x_{i+1} \\ y_{i+1} \end{pmatrix} \cdots \to \begin{pmatrix} x_n \\ y_n \end{pmatrix}$

$i=0$
$\delta_0 = 2^{-0} = 1$
$\alpha_0 = \tan^{-1}\delta_0$

$x_1 = x_0 - \delta_0 y_0$
$y_1 = y_0 + \delta_0 x_0$
$z_1 = z_0 + \alpha_0$

$i=i$
$\delta_i = 2^{-i}$
$\alpha_i = \tan^{-1}\delta_i$

$x_{i+1} = x_i - \delta_i y_i$
$y_{i+1} = y_i + \delta_i x_i$
$z_{i+1} = z_i + \alpha_i$

$i=n-1$

◎ ただし $z_i > \theta$ かどうかで符号調整が必要

$$\alpha_i = \begin{cases} +\alpha_i & (z_i > \theta) \\ -\alpha_i & (z_i < \theta) \end{cases}$$

$$\delta_i = \begin{cases} +\delta_i & (z_i > \theta) \\ -\delta_i & (z_i < \theta) \end{cases}$$

◎ $\cos\theta = \dfrac{x_n}{k_n x_0} = x_n$

$\sin\theta = \dfrac{y_n}{k_n y_0} = y_n$ $\quad x_0 = \dfrac{1}{k_n}$ とすると簡単

$k_n = \sqrt{1+\delta_0^2}\sqrt{1+\delta_1^2}\cdots\sqrt{1+\delta_{n-1}^2}$ ← これはあらかじめ計算できる