analysis

$$a_0 = \frac{1}{2\pi} \int_0^{2\pi} x(t) dt$$

$$c_0 = \frac{1}{2\pi} \int_0^{2\pi} y(t) dt$$

$$a_k = \frac{1}{\pi} \int_0^{2\pi} x(t) \cos(kt) dt$$

$$b_k = \frac{1}{\pi} \int_0^{2\pi} x(t) \sin(kt) dt$$

$$c_k = \frac{1}{\pi} \int_0^{2\pi} y(t) \cos(kt) dt$$

$$d_k = \frac{1}{\pi} \int_0^{2\pi} y(t) \sin(kt) dt$$

synthesis

$$\begin{bmatrix} x(t) \\ y(t) \end{bmatrix} = \begin{bmatrix} a_0 \\ c_0 \end{bmatrix} + \sum_{k=1}^{K} \begin{bmatrix} a_k & b_k \\ c_k & d_k \end{bmatrix} \begin{bmatrix} \cos(kt) \\ \sin(kt) \end{bmatrix}$$