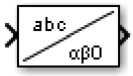
Perform transformation from three-phase (abc) signal to αβ0 stationary reference frame or the inverse

Library

Control and Measurements/Transformations

Description



The abc to Alpha-Beta-Zero block performs a Clarke transform on a three-phase abc signal. The Alpha-Beta-Zero to abc block performs an inverse Clarke transform on the αβ0 components.

$$\begin{bmatrix} u_\alpha \\ u_\beta \\ u_0 \end{bmatrix} = \begin{bmatrix} \frac{2}{3} & -\frac{1}{3} & -\frac{1}{3} \\ 0 & \frac{1}{\sqrt{3}} & \frac{-1}{\sqrt{3}} \\ \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \end{bmatrix} \begin{bmatrix} u_a \\ u_b \\ u_c \end{bmatrix}$$

The inverse transformation is given by

$$\begin{bmatrix} u_a \\ u_b \\ u_c \end{bmatrix} = \begin{bmatrix} 1 & 0 & 1 \\ -\frac{1}{2} & \frac{\sqrt{3}}{2} & 1 \\ -\frac{1}{2} & -\frac{\sqrt{3}}{2} & 1 \end{bmatrix} \begin{bmatrix} u_\alpha \\ u_\beta \\ u_0 \end{bmatrix}$$

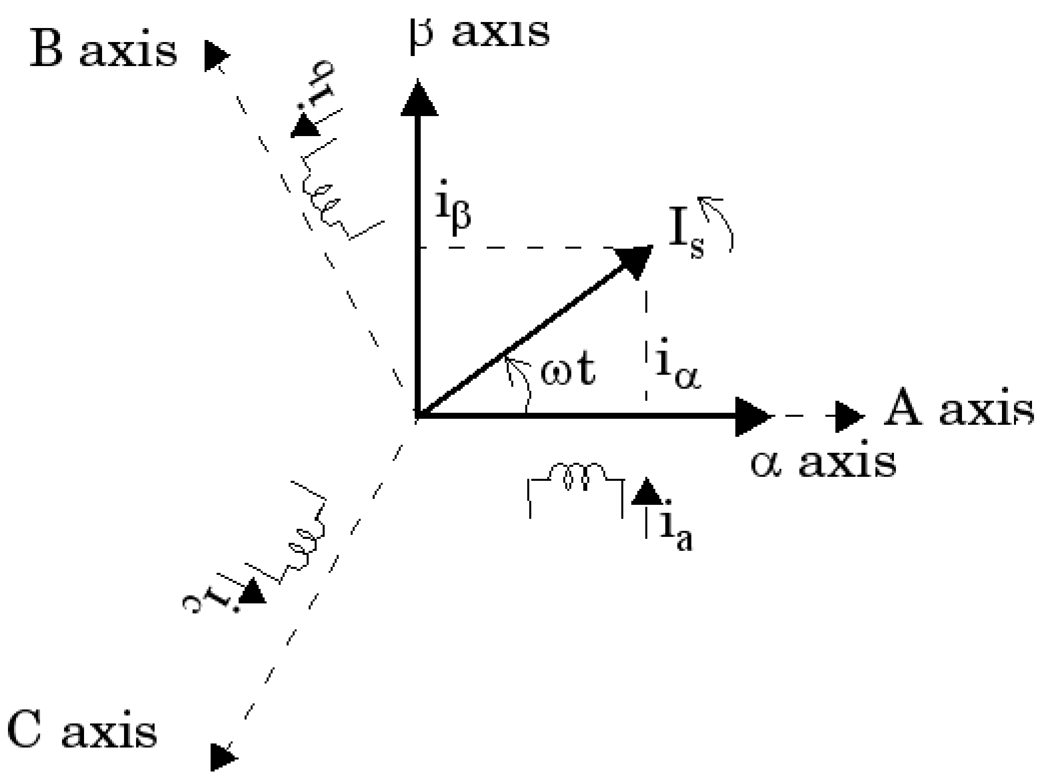
Assume that ua, ub, uc quantities represent three sinusoidal balanced currents:

$$i_a = I\sin(\omega t)$$

$$i_b = I\sin\left(\omega t - \frac{2\pi}{3}\right)$$

$$i_c = I\sin\left(\omega t + \frac{2\pi}{3}\right)$$

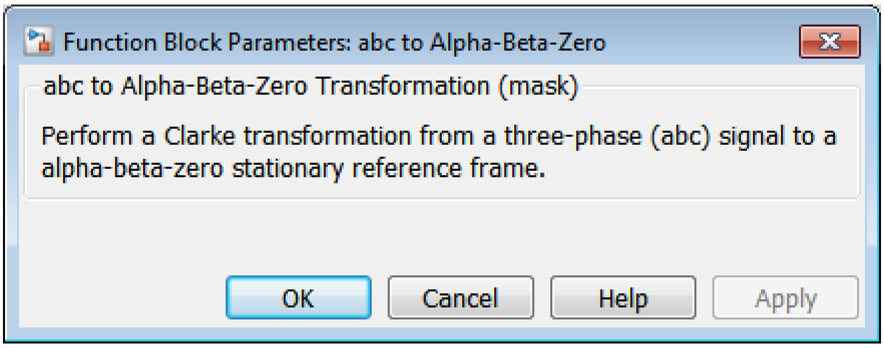
These currents are flowing respectively into windings A, B, C of a three-phase winding, as the figure shows.

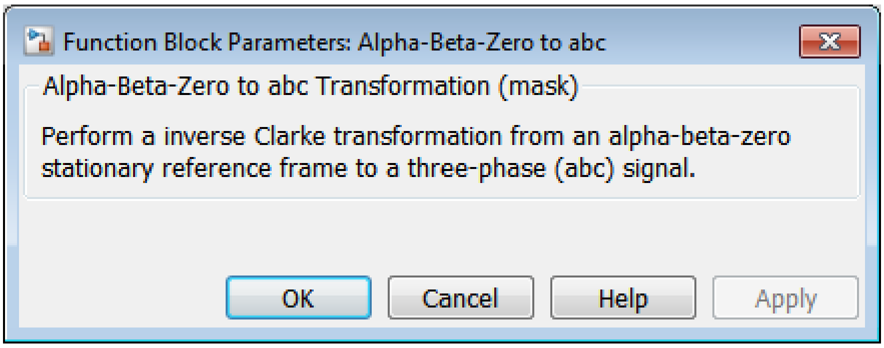


In this case, the iα and iβ components represent the coordinates of the rotating space vector Is in a fixed reference frame whose α axis is aligned with phase A axis. Is amplitude is proportional to the rotating magnetomotive force produced by the three currents. It is computed as follows:

$$I_s = i_a + j \cdot i_\beta = \frac{2}{3}\left(i_a + i_b \cdot e^{\frac{j2\pi}{3}} + i_c \cdot e^{-\frac{j2\pi}{3}}\right)$$

Dialog Box and Parameters

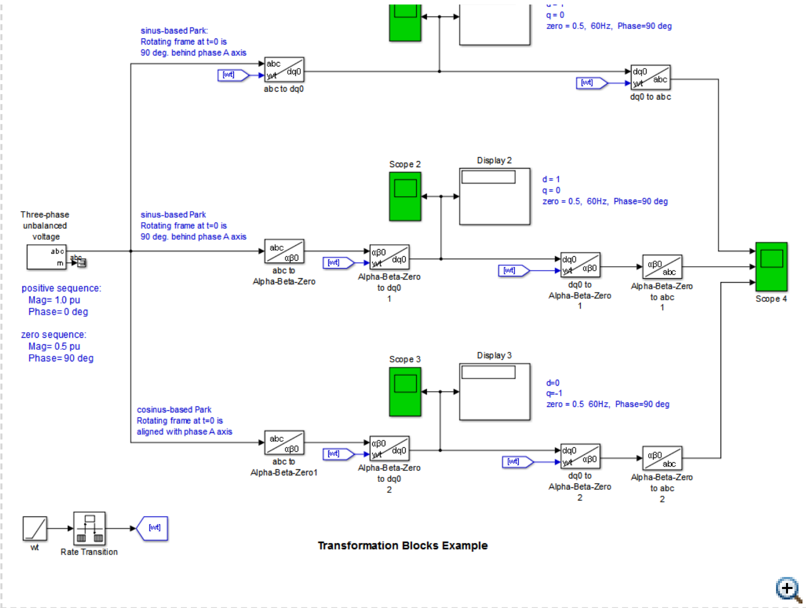




The block has no parameters.

Example

The `power_Transformations` example shows various uses of blocks performing Clarke and Park transformations.



Introduced in R2013a