Phasor operation : instantaneous to phasor

1 Description

This device converts the first harmonic of the instantaneous value of a signal to a phasor representation. The phasor representation is a 2-signal bundle of the polar coordinates of the phasor.

1.1 Pins

This device has two pins:

pin	*type*	*description*	*units*
in	input pin	probed signal	any
out	2-signal bundle	magnitude	same as input
		angle	rad

1.2 Parameters

The following parameter must be defined:

parameter	*description*	*units*
freq	rotation frequency of the phasor reference frame	Hz

1.3 Input

The input pin may be connected to any control signal.

1.4 Output

The output is the phasor representation of the first harmonic of the instantaneous value of the probed signal. The phasor representation is a 2-signal bundle of the polar coordinates of the phasor. The polar coordinates are the magnitude and angle of the phasor in a rotating reference frame.

The x-y coordinates of the phasor in that reference frame are calculated over a sliding time window of period equal to *1/freq*, as follows:

$$x = \frac{2}{\text{period}} \cdot \int_{t-\text{period}}^{t} in(t) \cdot \cos(2\pi \cdot \text{freq} \cdot t) \cdot dt$$
$$y = \frac{2}{\text{period}} \cdot \int_{t-\text{period}}^{t} -in(t) \cdot \sin(2\pi \cdot \text{freq} \cdot t) \cdot dt \qquad (1)$$

The negative sign for *y* follows the engineering convention for an inductive (lagging) current to have a negative angle when phasor rotation is counterclockwise.

The x-y coordinates of the phasor are converted to their polar equivalent of magnitude and angle for inclusion in the phasor bundle.

The phasor magnitude is the peak amplitude, not the RMS value. The phasor angle is expressed in radians.