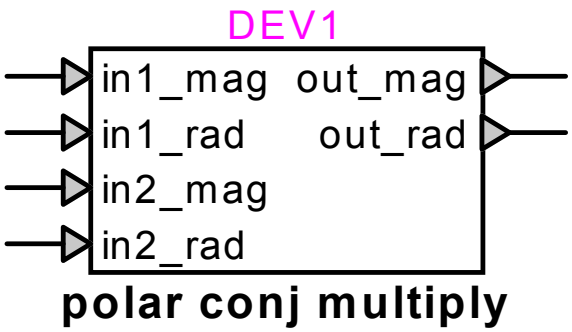
# Phasor operation : polar conjugate multiply

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## 1 Description

This device multiplies two vectors or phasors represented by their polar coordinates. The first vector is multiplied by the conjugate of the second vector.

### 1.1 Pins

This device has six pins:

| *pin* | *type* | *description* | *units* |
|---|---|---|---|
| in1_mag | input pin | input-1 magnitude | any |
| in1_ rad | input pin | input-1 angle | rad |
| in2_mag | input pin | input-2 magnitude | any |
| in2_ rad | input pin | input-2 angle | rad |
| out_ mag | output pin | output magnitude | units(in1_mag)*units(in2_mag) |
| out_rad | output pin | output angle | rad |

### 1.2 Parameters

No parameters are required for this device.

### 1.3 Input

The input pins may be connected to any control signals.

### 1.4 Output

The outputs are the polar coordinates of the product of the first input vector by the conjugate of the second vector.

The operation is immediate, and is calculated as follows:

$$\begin{aligned} out_mag &= in1_mag \cdot in2_mag \\ out_rad &= in1_rad - in2_rad \end{aligned} \qquad (1)$$