Waveform Generation Toolkit

Description

There are several waveforms which are usually used as a test signal in many DSP applications. These forms include: sinusoidal, square, Dirichlet, sawtooth, triangle, rectangles, sinc, square and similar functions. In MatDeck, there is the wavefrom() toolkit which is conveniently used to generate waveforms and to plot them within an embedded graph.

Waveform generation

In order to generate the desired waveforms, the user needs to define the waveform toolkit with an appropriate string ID. All signal waveforms are generated as unit functions, with an amplitude equal to unity and/or period, and/or length, equal to unity. In that sense, waveforms of different amplitude, length, or periods are obtained by manipulation of the independent variable which is generated as the input signal.

Let us start with the generation of a unit rectangle signal. After the waveform is generated, the independent variable ,t, in most cases it represents time, is generated. The independent variable defines the length of the generated waveform. The rectangle is generated by using only one parameter, that it is half the length of the rectangle.

$f :=$ waveform$(0$, "FormWave11"$)$ Generate waveform named FormWave11

$t :=$ ynodes$(x$, -50 , 50 , 1000$)$ Independent variable -time

$y :=$ waveformresult$(f$, $t)$ Generated waveform which can be used in processing
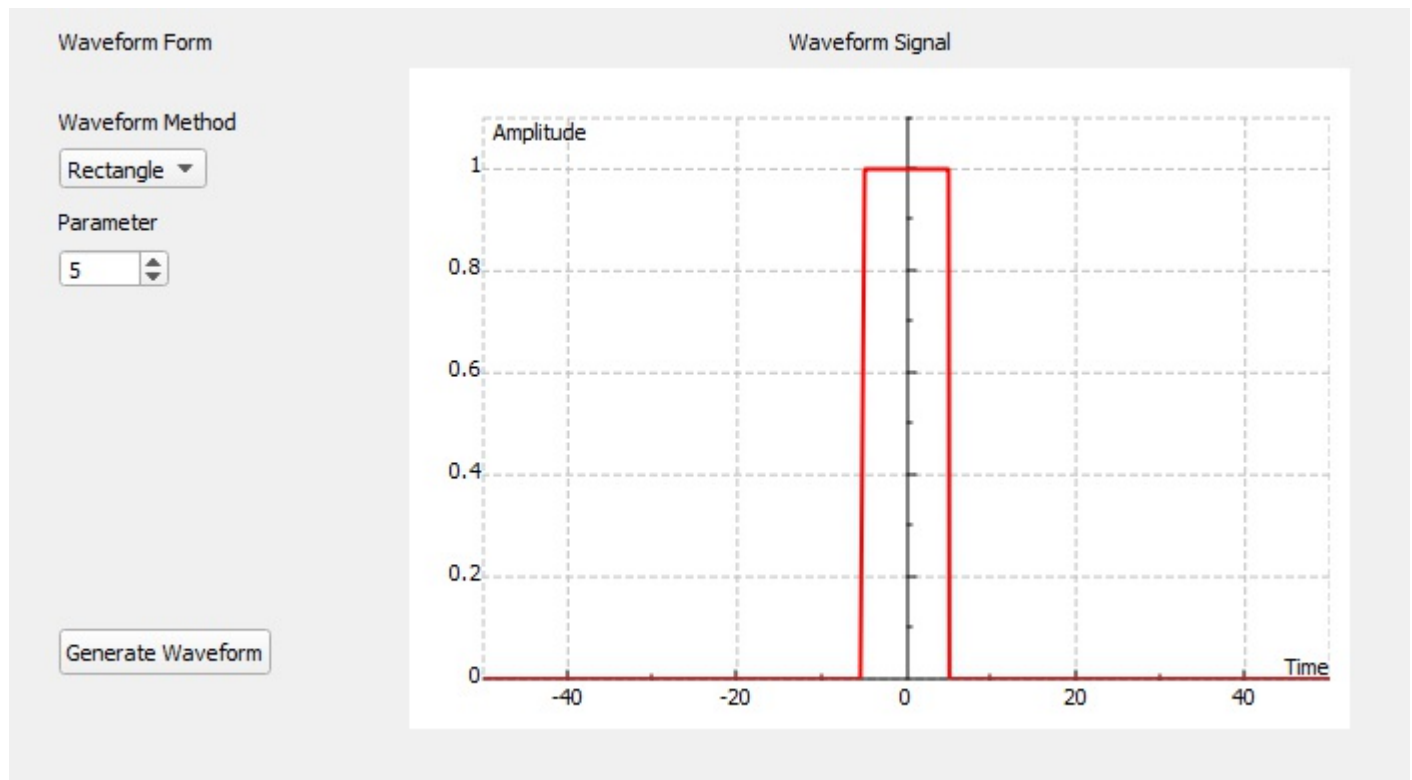
$graf1 :=$ join mat cols$(t$, $y)$

Manipulation with independent variable

If it is required to obtain a delayed version of the rectangle, for example below the time is delayed by 10 units of time, we must change the independent variable in the waveformresult(function) which we called. In order to plot the results we use a different form named, "FormWave12".

$f1 := \text{waveform}(0, \text{"FormWave12"})$

$y2 := \text{waveformresult}(f1, t - 10)$

Waveform Form

Waveform Signal

Waveform Method

Rectangle ▼

Parameter

5 ⬍

Generate Waveform