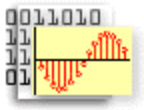

About This Extension Pack

The *Signal Processing Extension Pack* is a collection of 76 useful signal processing functions. Once you have installed the extra functions that come with this extension pack, they are available whenever you run Mathcad. Consult the installation instructions for further details.

The quickest way to get to know the Signal Pack is to browse through this E-book. The **index** lists all the functions, and each function name is hyperlinked to a document that describes that function and usually some related functions as well.

When a document discusses several functions, the page where the information on each function begins is shown at the top of the document. Some documents contain 10 or 20 screens, so be sure to scroll down to see all the information on the functions discussed.

Here are some points to remember when you use these signal processing functions:

- You don't need to have this E-book open to use the signal processing functions. They are available as soon as you install the extra functions.
- All functions in this pack require dimensionless arguments; don't use arguments that have units attached. Frequency is generally measured in Hertz-seconds, that is, as a fraction of the sampling frequency. Frequency arguments are thus typically between 0 and 0.5.
- We use Mathcad's default numbering for arrays throughout this E-book, with the first element having index 0.
- Many of the signal processing functions are based on the discrete Fourier transform and make use of Mathcad's built-in FFT routine. In order to provide maximum flexibility, we have not restricted the lengths of input arrays to powers of 2. But note that when a long input vector has a length with only one or two factors, the FFT routine will be slow. (In the extreme case in which the length is a large prime, the FFT can do no better than add up the exponential sums that define the transform.) Thus a small change in the length can make a big difference in computation time. Compare the computation of CFFT for a vector of length 5000 and one of length 4999. Note that CFFT implements the standard definition of the discrete Fourier transform, in which the forward transform uses the kernel **exp**$(-2\pi jmn/N)$ and is scaled by $1/N$.
- Many of the functions in this pack have restrictions on their arguments. For example, most of the transform and correlation functions work only on real input vectors, and the sine and cosine transforms require arguments of even length. See the E-book sections on the individual functions for details.

A Signal Processing Bibliography

The functions in this pack implement methods and algorithms described in the following books, which are good sources for further background on signal processing.

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