

DISPRO®

USER-INTERFACE FEATURES

- Easy to use pull-down and pop-up menus speed and simplify the design process
- Entry of specifications on graphics model of desired frequency response
- User control of all tradeoffs between specifications and order / length
- Independent entry of filter order / length and specifications
- Full retention of parameter values during tradeoff analysis—no retyping
- Hardcopy output of any screen plot on Epson or HP LaserJet compatible printer
- Automatic naming of filter data files, with user override

FILTER DESIGN

• **IIR FILTERS DESIGNED VIA BILINEAR-Z TRANSFORMATION**

Low Pass, High Pass, Band Pass, and Band Stop

Up to order 99

Butterworth
Chebyshev I
Chebyshev II
Elliptic

User-controlled ordering of biquad sections

Scaling of biquad sections to combat overflow in fixed-point arithmetic

• **FIR LINEAR-PHASE FILTERS**

Parks-McClellan-Remez

Up to length 2000

Low Pass, High Pass, Band Pass, and Band Stop

Multiband (up to 7 bands)

Approximate length computed from specifications—can be overridden

Compensation for zero-order hold distortion (sin x / x rolloff) of DAC

Arbitrary Magnitude Shape Specification:

Linear or dB amplitude scale
Piece-wise linear interpolation between specified points
Values input from file or keyboard
Built-in editor for specified point values
Keyboard input can be saved to disk file

Kaiser-Windowed

Up to length 8191

Low Pass, High Pass, Band Pass, and Band Stop

Approximate length computed from specifications--can be overridden

• **COEFFICIENT VALUES & WORDLENGTHS FOR ALL FILTERS**

32-bit Floating-Point

4-bit to 24-bit Integer / Fixed-Point

Displayed on screen or printed: decimal, integer, 2's-complement hex values

• **POLE-ZERO VALUES FOR IIR FILTERS**

For Floating-Point Coefficients

For 4 to 24 bit Integer / Fixed-Point

Table of Numerical Values (magnitude, angle in degrees and Hz)

Graphics plot in z-Plane

• **FREQUENCY RESPONSE COMPUTATION AND PLOTTING**

Any coefficient wordlength

Linear or dB magnitude

Numeric values for any set of frequencies, displayed on screen or printed

FIR:

Full range plot: up to 4096 points using FFT

Any frequency range: up to 1000 points

Specified arbitrary-magnitude values can be plotted with actual response

IIR:

Any frequency range: up to 1000 points

Phase (degrees) and delay (samples)

DISPRO®

FILTER PERFORMANCE EVALUATION

• **TEST SIGNAL GENERATION**

Sum of sine waves:

- Specified by Fourier series coefficients
- Specified as arbitrary frequencies, amplitude, and phase

Special waveforms:

- Rectangular pulse (arbitrary starting point, amplitude, and length)
- Square wave (arbitrary period, amplitude, and number of periods)
- Sawtooth wave (arbitrary period, amplitude, and number of periods)
- Triangular wave (arbitrary period, amplitude, and number of periods)
- Chirp signal (arbitrary initial & final frequencies, and length)
- Gaussian white noise, arbitrary rms level (can be added to sum of sine waves)

• **IIR & FIR FILTER SIMULATION**

IIR Biquad Topology: Canonic form and Merged-biquads

FIR Topology: Direct implementation of convolution sum

Arithmetic:

- Computation wordlength: 3 to 23 bits-plus-sign
- Accumulator: single / double length, saturating / 2's-complement arithmetic
- Truncation or rounding

Coefficients:

- Any wordlength less than or equal to computation wordlength
- Scaling by any power-of-two

Excitation:

- Test signal file
- User-created file in proper format
- Impulse
- Step
- Sine Wave

• **TIME-DOMAIN PLOTTING**

- Linear or log-of-absolute-magnitude amplitude scale
- Decimal or integer values for linear amplitude scale
- Continuous or discrete-line plots, with optional marking of data points

IIR and FIR Filters:

- Forced-response
- Impulse response
- Step response
- Sine Wave response
- Excitation signal file
- User-created file in proper format

• **SPECTRAL ANALYSIS**

- Fourier series or Fourier transform
- Real-input FFT up to 8192 points
- Optional time sample windowing (Hann, Hamming, Blackman, Kaiser)

Data sources:

- Forced-, impulse-, step-response samples for IIR & FIR filters
- Any time sample file in proper format
- Keyboard input of sample values (which can be saved to a disk file)

Integrated plotting:

- Linear or dB magnitude
- Phase (degrees)
- Magnitude values: unnormalized; normalized to peak or specified component
- Continuous or discrete-line plots, with optional marking of data points

Tables of numeric values:

- Linear or dB magnitude
- Phase (degrees)
- Magnitude values: unnormalized; normalized to peak or specified component
- Show only values above / below a specified threshold
- Displayed on screen or printed