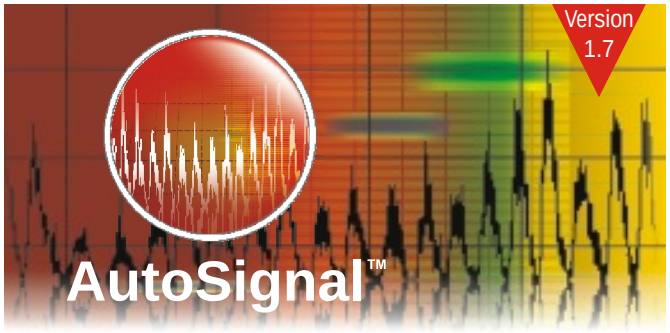
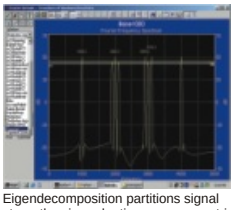


AutoSignal™

Perform complex signal analysis with a mouse click - no programming required!

AutoSignal is the first and only program to deliver complete automation for signal analysis. You will save precious time by eliminating the programming time that is normally required for performing sophisticated signal analysis. AutoSignal takes full advantage of its graphical user interface to simplify every aspect of operation - from data import to output of results. Choose your analysis techniques from the menu or toolbar and select the algorithm and options from the intuitive interface. You get immediate visual feedback with 2D or 3D graphs of your signal analysis, plus numeric summaries for reports.

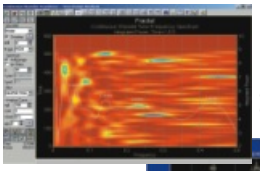
A timely breakthrough in cutting-edge signal analysis



Eigendecomposition partitions signal strength using adaptive non-parametric basis functions. Signal components can then be separated by differences in power. Eigendecomposition is also known as singular spectrum analysis, principal component analysis and eigenfiltering.

Quickly locate your signal components

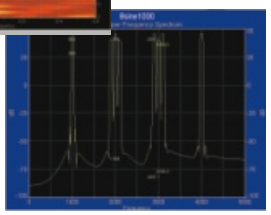
AutoSignal gives researchers the power to rapidly find components of complex signals that normally require extensive programming and mathematical routines. You get a vast array of spectral analysis procedures to help you make intelligent conclusions for any application. AutoSignal's built-in spectral analysis procedures include: FFT, AutoRegressive, Moving Average, ARMA, complex exponential modeling, minimum variance methods, Eigen analysis frequency estimation and wavelets.

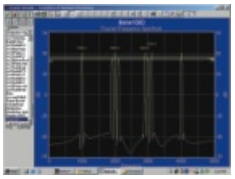


Instantly locate signal components in one single step

Identify frequency and power with Fourier Spectrum analysis

AutoSignal lets you see a complete picture of the frequency space using the library of six Fourier Spectrum methods with total flexibility. Solve the leakage problem found with standard FFT by using one of the 30 included data tapering windows. You can even make comparisons of performance of various data tapering windows in a single spectral graph. AutoSignal gives you access to the latest methodologies with techniques such as FFT Multi-taper Spectrum analysis to help you better characterize the power in each signal. Easily handle your unevenly sampled data with Lomb-Scargle Fourier domain analysis with techniques that were originally developed by astrophysicists.

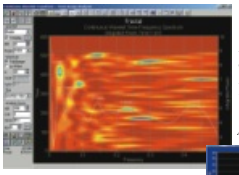




You can get more than the standard FTT technology with AutoSignal. Choose from one of the six FTT procedures and 30 tapering windows

Effortlessly analyze non-stationary data with wavelets

Simultaneously find the time and frequency localization components of a non-stationary periodic signal with Continuous Wavelet Spectrum analysis techniques. AutoSignal gives you a choice of three adjustable mother wavelets: Morlet, Paul and Gaussian Derivative - in both real and complex forms to optimize localization results. You can also perform power analysis in either time or frequency range with specialized in-depth analysis techniques to better evaluate the signal.



Need to solve for time and frequency of non-stationary signals? No problem. Perform power analysis of your signals with the latest wavelet technology. Select and adjust your mother wavelet for total control.

Isolate components by signal strength using eigendecomposition

In addition to FFT and wavelet spectral analysis techniques, you can select from linear and non-linear methods that are right for your application. The eigendecomposition procedures enable you to visually select eigenmodes for signal-noise separation or component isolation. With Autosignal, you can also recover signal components based on power - the component may be sinusoidal, a square wave, a sawtooth or an harmonic pattern. You can confirm the presence of white noise or isolate red noise background by reconstructing only the noise eigenmodes.

Tired of programming your signal analysis procedures?

Precisely estimate with advanced parametric modeling

With Autosignal, you get state-of-the-art parametric non-linear modeling for sinusoid and damped sinusoid models. Non-linear optimization is also available as an independent procedure, or as an adjunct to each of the spectral algorithms. It includes robust maximum-likelihood optimizations as well as automatic parameter constraints. Auto Regressive linear models offer robust models that can quickly handle smaller data sets that FTT cannot accurately analyze.

Easily smooth and process your signals

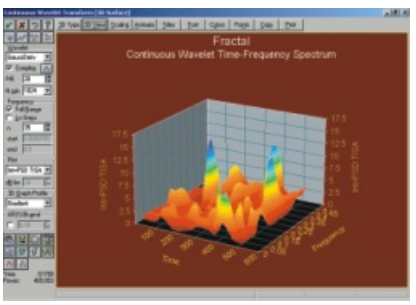
Only Autosignal offers so many different user-friendly methods to manipulate signal data. You can inspect your data stream in the Fourier domain and zero higher frequency points - and see your results immediately in the time domain. This smoothing technique allows for superb noise reduction while maintaining the integrity of the original data stream. Autosignal also includes eigendecomposition, wavelet, Savitzky-Golay, Loess and detrending for smoothing and denoising. Isolate components and detect signals with powerful filtering and reconstruction techniques with Fourier, eigendecomposition and wavelet methods. For instance, isolate components that appear and disappear with wavelet filtering and reconstruction. Recover the true signal that would have been measured using an ideal sensing system with Gaussian and exponential.

Graphically review signal analysis results

As a powerful visualization tool. Autosignal automatically plots your peaks, contours or 3D surfaces - so you don't have to perform additional steps to see your results. You can change any algorithm or analysis option through the user interface and see instant results. Isolate components of a signal graphically using eigendecomposition to display and select eigen components in order to find very low frequency oscillatory components or identify paired eigenmodes producing a specific oscillation. Then, analyze your results with residual and root plots, and show statistical significance and probability limits on your output graphs. Clearly present your results with control over titles, fonts, colors, points, scaling, axis scale, labels, grid and plot types.

Save precious research time with the production facility

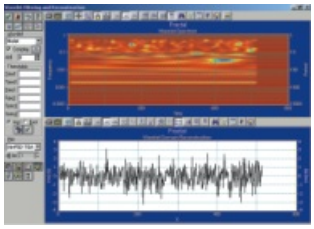
What once took hours now takes seconds - with only a few mouse clicks. It's so easy - even novice users can learn how to use Autosignal in no time. Every procedure is automated. For even more muscle, streamline your work with the production facility to automate batch analysis and reporting. With an easy- to- use dialog, set up your batch import and export options. Link directly to your hardware to analyze and report on the fly. Already have your data in Microsoft Excel? No problem. Process up to 255 Excel worksheets at once. Create RTF reports with numerical summaries that include publication-quality graphs or export the data to a new Excel workbook. With Autosignal, it's so simple!



Interact with your graphics to find the best perspective for a particular component

Autosignal is a powerful solution that solves real world problems - fast!

Unlike any other tool. Autosignal has an easy-to-use automated interface that requires no programming to perform signal analysis. Autosignal provides sophisticated tools for researchers to identify the underlying physical process that produces a given waveform. Every step of your analysis is automated, saving you the time normally required to perform calculations or programming. Filter, process and analyze your complex signals with interactive graphics and detailed numerical summaries.



Wavelet filtering and Reconstruction recreates signals from spectral components that have been isolated in the time-frequency domain

Communication signal identification and analysis
Signal interference monitoring
Control systems analysis
Audio system analysis
Voice recognition and speech processing
Signature analysis

Vibration analysis
Acoustical analysis
Radar signal analysis
Analog circuit testing
Signal detectors
Oceanographic study
Geologic study
Astrophysics

Autosignal provides you with a wide selection of state-of-the-art methods, including: spectral analysis, filtration and data reconstruction tools via FFT, parametric, eigen and wavelets. You also get time domain algorithms for smoothing, interpolating and prediction. Furthermore, Autosignal can be used in a classroom or lab to help students apply theories they've learned in classes such as physics or signal theory.

AutoSignal 1.7 Features

Interface
• Full 32-bit performance
• Toolbars and menu-driven for all functionality
• No programing of procedures, algorithms or graphing
• Advanced on-line help system

Data Input
• Up to 65,536 points in data table
• Over 65.4 million points can be filtered into table using decimation import filter
• ASCII (Single, X-Y, and Multi-column)
• Excel (Excel 97, Excel 95, v5,v4,v3)
• Lotus 123 (WK4,WK3,WK1)
• QuattroPro(WB2,WB1)
• SigmaPlot(JPG,SPW,SP5)
• SPSS (SAVv7.5 and v8)
• SYSTAT(SYD)
• Waveform (WAV MS PCM 8,16,32 bit)
• DIF (Single, X-Y, and Multi-column)
• dBase (DBF III+,IV)
• Import Preview graphs prospective data
• Separate append options automatically average replicates

Data Management
• Graphical and numerical sectioning; graphically enable or disable data points
• Spreadsheet-like data editing
• Signal Generate tool
• Data transformation of variables
• Local options to change data set during current procedure include sectioning, detrending, Fourier filtration, eigendecomposition filtration

Fourier Spectral Analysis
• Procedures: Fourier Spectrum, Fourier Spectrum with Data Window, Fourier Spectrum with Data Window Comparison,* Fourier Spectrum of Segmented Data, Fourier Multi taper Spectra, Fourier Spectrum of Unevenly Sampled Data (Lomb-Scargle)
• Transforms: FFTRadix2, Prime Facto, Mixed Radix, Chirp-Z, Best Exact-N
• Zero pad
• 30 tapering windows
Fixed: none, Welch, Bisquare, Bartlett, cs2 Hanning, Tukey-Hanning, cs2 Hamming, Bartlett Mod, cs3 Nuttall C3, cs3 Blackman, cs3 Blackman-Harris 3, cs3 Nuttall Cl, cs3 Blackman Exact, cs3 Blackman-Harris min, cs3 Nuttall min, cs4 Nuttall C5, cs4 Blackman-Harris 4, cs4 Nuttall C3, cs4 Nuttall Cl, cs4 Blackman-Harris min, cs4 Nuttall min
Adjustable: Beta, csx max Roll-off, Kaiser Bessel, VanderMaas, Chebyshev, Chebyshev Appr, Slepian DPSS, Gaussian, Tapered-Cosine
• Compare up to 4 tapering windows simultaneously
• Measure data window properties: mainlobe, sidelobe, roll-off

Non-Parametric Spectral Analysis
• AR spectral methods offer accurate frequency estimation with short data records
• AR Spectrum procedures: AR Spectrum, AR with order explanation, AR with algorithm comparison *
• 14AR algorithms: autocorrelation method, maximum entropy method (Burg), least- squares normal equations, least-squares covariance models and modified covariance models, singular value decomposition methods
• Model order selection and order exploration
• Moving average spectrum
• ARMA spectrum
• Prony Spectrum offers fitting of damped sine and damped exponential that occur in multi- component exponential decays
• Minimum Variance Spectrum

Eigen Analysis Spectrum
• Eigen Analysis Spectrum provides accurate and robust spectral procedures for estimating harmonic frequencies
• Provides excellent signal-noise separation
• Graphically select signal and noise sub-space; also available in certain parametric procedures

Time-Frequency Spectral Analysis
• Short-Time Fourier Transform Spectrum uses a series of segmented and overlapped FFTs to find Fourier spectral information for non- stationary data
• Continuous Wavelet Spectrum multi- resolution time-frequency techniques: 3D surface, contour, power integration across time or frequency
• Wavelet spectra can be generated with up to 100 linear or logarithmic frequencies
• Adjustable mother wavelets: Morlet, Paul, Gaussian Derivative
• Zero padding available
• Full critical significance limits available as 3D gradients
• Graphical rendering of cone of influence
• Automated power analysis by integrating interpolated wavelet spectrum surface

Data Processing
• Non-Linear Optimization offers parametric refinement of spectral estimates: least- squares, maximum likelihood
• Fourier Interpolation
• Fourier Upsampling
• Parametric Interpolation and Prediction
• Graphically inspect the autocorrelation series
• Detrend: Constant, Linear, Quadratic, Cubic, Logarithmic, Exponential, Power, Hyperbolic
• Difference the data with adjustable order and lag, compute various cumulatives and normalize for unit area, unit power, unit standard deviation and zero mean
• Add or subtract a reference signal
• Compare imported reference signals
• Gaussian deconvolution or exponential deconvolution to remove instrument response smearing *
• Find long-term "memory effects" in flat frequency response signals with Fractal Dimension option

Filtering and Reconstruction
• Fourier Smoothing and Denoising: frequency or signal threshold filtration
• Eigendecomposition Smoothing and Denoising: signal strength threshold filtration
• Wavelet Smoothing and Denoising: thresholds in the time-frequency domain for non-stationary data.
• Fourier Filtering and Reconstruction: Fourier domain filtering and component isolation procedure
• Eigendecomposition Filtering and Reconstruction: isolates individual oscillatory components in signals
• Wavelet Filtering and Reconstruction: isolates in the tune-frequency domain
• Savitzky-Golay Smoothing filter
• Spline Estimations: cubic, cubic constrained, smoothing cubic, B-spline, B-Spline Fix knots, &pline Optional knots, NURBS
• Adjustable Loess with tricube and Gaussian weighting

Graph Options and Types
• Customization: Titles, axis labels, font size, font selection, grid, color schemes, point formats, axis scaling, log axis scaling, toggle data, reference
data and function label display, modify contour and mesh properties
• Save and import Views for standardized layouts
• 3D Graph View: View Angles, Size in Frame, illumination angular shifts, perspectives, back planes, add contour plots
• 3D Graph Types; Wire frame, mesh plot, 15 gradientplots, 4 shaded plots
• Gradient and shaded plots use up to 48 colors
• Plot formats: Real, Imaginary, Magnitude, Phase, Mag/Phase (dual plot). Amplitude, Ampl/Phase (dual plot), dB, dB Norm, PSD SSA, PSD MSA,
PSD TISA, Variance, Lomb, dB 1-sided and dB 2-sided, spectrum directly, spectrum as dB, spectrum as dB normalized, variance-normalized power
spectrum, MagnitudeSq

Graphical Review
• Spectral peaks are identified graphically; select the number of peaks to detect
• Display maxima with spectral peak labels: frequencies, spectral magnitudes, both frequencies and spectral magnitudes, none
• Statistical feedback: set confidence/prediction intervals, show confidence/prediction intervals, error bars, critical limits, display residuals, display residuals as % of Y, residuals as fraction of SE, display residuals
distribution, display delta SNP (stabilized normal probability) plot
• 3D Graph animation
• Intellimouse rotation of 3D view angles
• Mesh resolution up to 300 x 300
• View residuals, plot roots and plot selection criteria

Numeric Review
• Full component numeric summary report includes: procedure, algorithm, listing of interpolated spectral peaks, frequency analysis and linear least-squares
fit summary
• List data offers extended data summary for each of the results points generated in a procedures such as frequency, magnitude, phase and power spectral density
• Goodness of fit statistics: r 2 , degrees of freedom adjusted r 2 , fit standard error, F-statistic

Significance Levels
• Unique Peak-based critical limit levels to ascertain the significance of the spectral components to disprove null hypothesis that the signal is noise
• Critical limits levels plotted are: 50%, 90%, 99%, 99.9% (uses color gradients for wavelets)
• Peak-type critical limits generated using Monte Carlo trials
* Selection of background spectrum option available

Output and Export
• Publication-quality printed graphs
• Image formats include bitmaps, metafiles, enhanced metafiles and device-independent
bitmaps
• File formats include ASCII, Excel, Excel 97, Lotus, SYSTAT, SPSS
• Export numerical summaries and graphs to Microsoft Word RTF documents

Production Facility *
• Batch process large numbers of data sets
• Import: DLL interface or import multiple data sets from Excel 95/97 with
up to 255 worksheets and multiple rows per worksheet
• Export numerical summaries and or graphs to Microsoft Word RTF documents
• Export resulting analysis basic data or the full extended data to Excel 95/97 to one or up to 255 worksheets

System Requirements Microsoft Windows*95,98 and NT Pentiums or clone and above; 32MB RAM minimum (64MB RAM for wavelet and production facility recommended); 25MB hard disk space; SVGA or better
* - New in AutoSignal 1.7

For more information contact: www.seasolve.com

SeaSolve Software Inc.,
235 Walnut St., Suite 7
Framingham,
MA 01702 USA.
Phone : 508-872-5100
Fax : 508-872-5120
Email : info@seasolve.com