Fit thousands of equations to your data in seconds!

Automated surface fitting and equation discovery
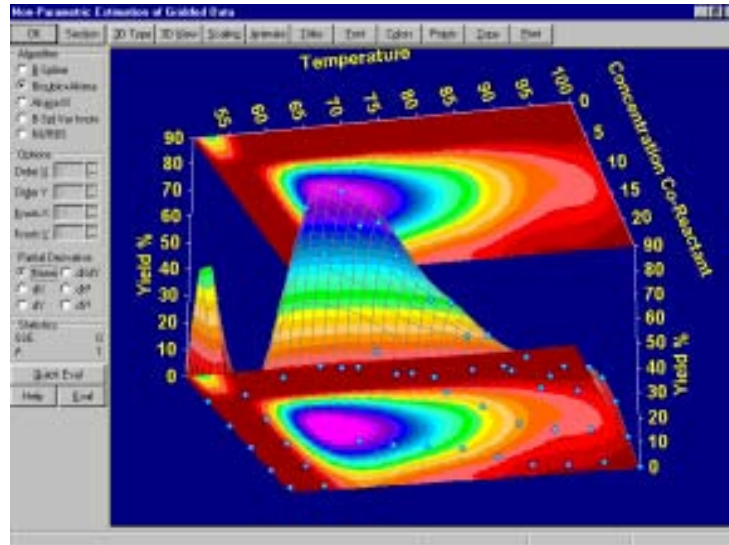
"I have tried other products including my own programs and I can truthfully say,, There is no competition to the TableCurve Programs."
Patrick Lestrade
Professor of Physics,
Mississippi State University

FIND OPTIMUM EQUATIONS TO DESCRIBE EMPIRICAL DATA
TableCurve 3D gives scientists and engineers the power to find the ideal model for even the most complex data, including equations that might never have been considered. TableCurve 3D's built-in equation set includes a wide array of linear and nonlinear models for any application:
• Linear equations
• Polynomial and rational functions
• Logarithmic and exponential functions
• Nonlinear peak functions
• Nonlinear transition functions
• Nonlinear exponential and power equations
• User-defined functions (up to 15)

TableCurve 3D's state-of-the-art surface fitting includes capabilities not found in other software packages:
• In addition to standard least squares minimization, TableCurve 3D's non-linear engine is capable of three different robust estimations: least absolute deviation, Lorentzian minimization and Pearson VII Limit minimization
• Option to change the maximum number of terms permitted when fitting linear equations (minimum 3; maximum 11)
• On systems that support multi-threading, TableCurve 3D's Background Thread Processing option allows fitting to occur without any form of user input
• Option to set the default term significance anywhere from 1 to 15

AUTOMATION TAKES THE TRIAL AND ERROR OUT OF SURFACE FITTING
Using its selective subset procedure, TableCurve 3D will fit 36,000 of the over 450 million built-in equations or just the ones you need — instantly. With TableCurve 3D, a single mouse click is all it takes to start the automated surface fitting process — there is no set up required! You can even enter your own specialty models to be fit and ranked along with the built-in equations. TableCurve saves you precious time because it takes the endless trial and error out of surface fitting.

FIT USER-DEFINED FUNCTIONS
Up to 15 user-defined equations can be entered and ranked along with the built-in equations. These specialized models can contain most mathematical constructs, including special functions, series convergence and conditional statements, differentiations, integrations and parameter constraints.
TableCurve 3D even offers the option of graphically adjusting equation parameters to assure convergence for the fit of user-defined models. Unlike most surface fitting programs, TableCurve 3D's user-defined functions are compiled so they can be fitted at nearly the speed of the built-in equations. For maximum flexibility, TableCurve 3D gives you the option to save your functions as individual files, in libraries or both.

TableCurve 3D®
Automated Surface Fitting Analysis

# Automated surface fitting and equation discovery

Visually discover the best equation to model your data

GRAPHICALLY REVIEW SURFACE FIT RESULTS

Once your XYZ data have been fit, TableCurve 3D automatically sorts and plots the fitted equations by the statistical criteria you select (r^2, DOF adjusted r^2 , Fit Standard Error or the F Statistic). Graphically review the fitted results as you scroll through the equation list. A 3D residuals graph as well as parameter output are generated for each fitted equation. Add confidence or prediction intervals to the graph to detect outliers in your data. You can also automatically display a 2D contour plot on the top and bottom of the surface fit graph to get another view of your data. Data, statistical and numeric summaries are also available from within the Review Surface Fit window so you can further analyze fit results. Viewing a surface fit from all angles is imperative in determining whether or not a given fit is accurate. Using a simple interface, TableCurve 3D lets you view a graph from any angle. It will even animate the graph automatically in a specified XY and or Z angle sequence. Just sit back and observe every nuance within the fit. TableCurve 3D gives you allot the tools you need to discover the model that best meets your requirements for the ideal fit

FLEXIBLE OUTPUT OPTIONS

Output TableCurve 3D's publication-quality graphs in black and white or color, portrait or landscape. You can also produce files containing data and equations in Lotus, Excel, ASCII, Quattro Pro and SigmaPlot formats. TableCurve 3D can speed up your programming by generating actual function code and test routines for all fitted equations in FORTRAN, C, Basic, C++, Java, MATLAB and Pascal.
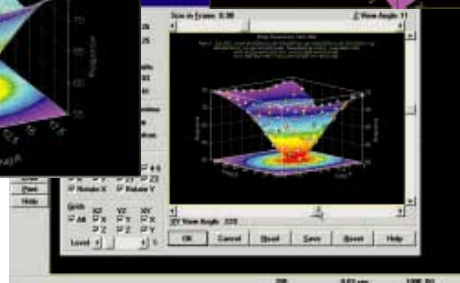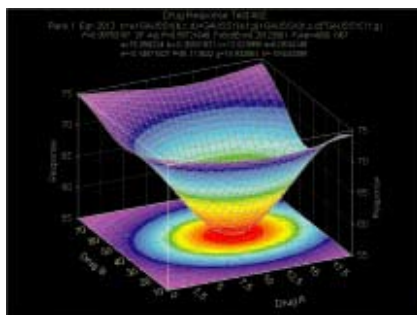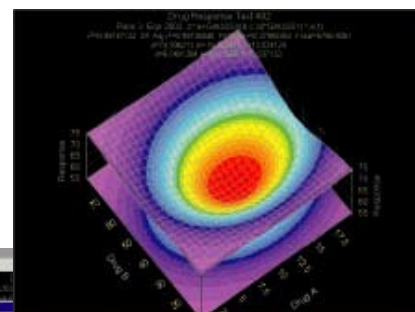
WITH ALL THIS POWER, IT'S STILL EASY TO USE!

TableCurve 3D takes full advantage of the Windows graphical user interface to simplify every aspect of operation — from data import to output of results. Import data from many popular file formats including SigmaPlot, Excel, Lotus, SPSS and ASCII. Once your data are in the TableCurve editor, start the automatic fitting process with a single mouse click. Choose to fit all equations, select a group of equations or create a custom equation set. All equations are readily available from the Toolbar or TableCurve's Process Menu. You can even set up TableCurve 3D to begin fitting the moment data are imported or modified with Background Thread Processing Fitting. Users consistently comment that — out of the box, without reading the instructions — TableCurve is highly intuitive, easy-to-use and remarkably simple to learn.

NEED 2D DATA-FITTING CAPABILITIES?

TableCurve 2D fits and ranks almost 3,665 built-in equations to your data in seconds. TableCurve 2D's comprehensive data, statistical and numeric summaries combined with its publication-quality 2D graphs give you the power to quickly and easily find the best model for your XY data.

### The Essential Desktop Tools for Scientists and Engineers

• **SYSTAT**®, More graphs, more statistics, less effort
• **AutoSignal**™, Transform time in no time
• **TableCurve 2D**®, Automated curve fitting and equation discovery
• **TableCurve 3D**®, Automated surface fitting and equation discovery
• **PeakFit**®, Automated peak separation and analysis

TableCurve 3D®
Automated Surface Fitting Analysis

Automated surface fitting and equation discovery

Automated Surface Fitting Analysis
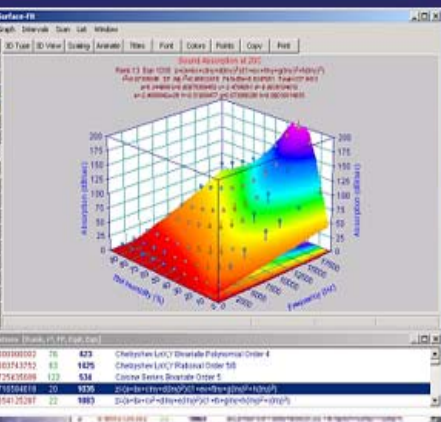
TableCurve 3D

Better 3D Visualization

One of the most important requirements in surface fitting is the ability to see the nuances of surfaces between various models. Release 4 of TableCurve 3D adds two important 3D visualization enhancements. For shaded surface graphs, there is now photo-realistic surface rendering. Up to 90,000 vertices can be plotted, resulting in ultra-high 3D surface resolution. For gradient plots, release 4 adds continuous gradient spectrum plots. The spectrum plots in previous versions had been limited to 24 discrete colors. A continuous gradient makes it much easier to discern transitions within a surface.

Better Data Management

It is now possible to have multiple data sets open simultaneously. A tree-structured import manager makes it simple and fast to switch between data sets or to select any set within any worksheet of an Excel file or analysis node in a data set. The current state of the data sets and its analysis are saved across sessions offering the means to immediately resume work without re-importing the data. A TableCurve 3D data tree can contain any number and/or type of data sets and the processing instructions for all surface-fits and other procedures used in a particular analysis, and since only references to the data are saved, all changes made externally in the data sources are immediately reflected upon import.
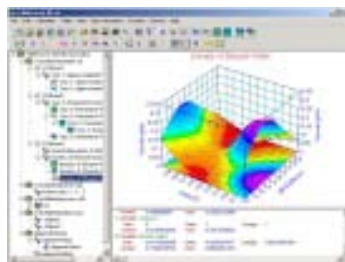
Matlab Export

Release 4 of TableCurve 3D adds the means to export Matlab m files for all 453,697,492 built-in equations. With this enhancement, TableCurve 3D becomes an invaluable productivity tool for Matlab users who need to occasionally or frequently model surfaces within the context of the many varied Matlab toolboxes. TableCurve 3D v4 also generates all auxiliary functions needed to evaluate the equations, so only the main Matlab environment is required in order to use these .m files.

Object-Oriented Code Export

In today's programming environments, it is sometimes desirable to drop in a self-contained numeric class that mathematically represents a surface. TableCurve 3D v4 offers the option of exporting both C++ and JAVA classes for any of the built-in equations. These classes contain built-in evaluation and root-finding using well crafted object oriented design.

SigmaPlot 3D Graph Export

For the ultimate in publication quality graphs, release 4 now exports the latest SigmaPlot graph files. Both SigmaPlot 2001 and SigmaPlot 2000 are supported. This makes it possible to painlessly transfer 3D surfaces and data to SigmaPlot to fine tune 3D surface graphs for journal and other technical publications.

Unattended Batch Fitting of Multiple Data Sets
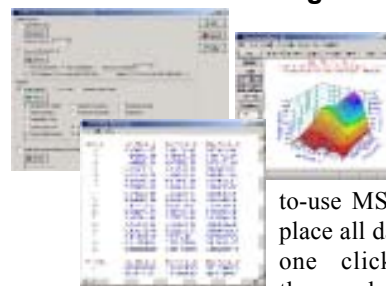
For those instances where large numbers of similar data sets must be fitted to a specific model, or pre-processed through a specific procedure, TableCurve 3D offers an easy-to-use MS Excel-based automation. Simply place all data sets within an Excel file and in one click process hundreds or even thousands of data sets against a given surface-fit equation or non-parametric procedure. The graphs in full vector-based resolution and all reports can be streamed to a MS Word (or generic RTF) file, while all numeric information is written to a new Excel file.

Instrumentation Interface

Release 4 of TableCurve 3D can serve as a 3D visualization and analysis engine for any instrumentally acquired source of 3D data. Although this requires the coding of a Windows DLL, the task is made simple by C-based template DLL source code. Add only the instrument-specific acquisition code.

Better Review Organization

With the advent of larger screen sizes on today's computers, it is possible to simultaneously view many of the important elements of a surface fit. TableCurve 3D v4 adds six predefined tiling options for the Review windows that maximize the use of space and make it easy to switch between different modes of analysis. Any number of Review layouts can now be saved to disk and recalled when needed.

Advanced Evaluation

Release 4 adds a completely revamped Evaluation option. Evaluation sequences are now saved across sessions and can be saved to disk. The precision of output and the various confidence levels can be set on the fly, and all sequences are automatically updated when changing equations. Using the latest in Windows technology, it is a simple matter to sort columns or export the table to Excel, Word, or other applications.

Latest MS Office Support

Release 4 adds the means to export all numeric data in the latest versions of Excel and to stream graphs and reports to Word, including the newest 2002 releases. TableCurve 3D v4 is designed to work transparently and effortlessly with the MS Office family of products. For example, full-resolution 3D vector graphics can be pasted into Word, Excel, or PowerPoint.

INTERFACE
- Revamped Graphical User Interface.
- Automatic Window Placement in Review.
- Window Office XP Style ToolBars.
- Better Review organization
- Full 32-bit performance
- Multitasking with 11 background thread surface-fit options
- Advanced online help system
- Drag and drop files for immediate fitting
- Fully customizable 3D surface graphs, including gradient and shaded plots
- Smooth bitmap rendering of graphs
- Caching of compressed 3D surface-fit graphs for instant rendering, including background thread
- Nonlinear sampler option for visualizing 3D surfaces of nonlinear models

INTEGRATED AUTOMATION
- Batch processing for automatically processing large number of data sets unattended; available for all major procedures.
- Multiple data sets in an excel spreadsheet processed with the ease of single data set.
- Stream reports directly to MS Word 95/97/2000 or RTF format.
- DLL support for writing external data acquisition interface.
- Professional DLL automation interface for instrument manufacturers.

DATA INPUT
- Up to 16,384 points in data table
- 16.4 million points can be filtered into table using averaging digital import filter
- File types: ASCII, Excel, Lotus, Quattro Pro, SigmaPlot, dBASE, DIF, SPSS
- Weights optionally assigned

DATA MANAGEMENT
- Graphical and numerical sectioning; graphically enable or disable data points
- Apply calculations to X, Y, Z and Weight values
- Spreadsheet-like data editing with optional graphing of data as they are being entered

SURFACE-FITTING
- 453,697,387 built-in equations
- 243 polynomials, including 18 Taylor series polynomials
- 260 rationals, Including 4 rationals with Taylor series numerators and denominators
- 453,696,714 selective subset mixed basis function linear equations, of which up to 36,582 will be selected within a given fit
- 72 3D nonlinear peak equations

- 72 3D nonlinear transition equations
- 24 3D nonlinear exponential and power equations
- 4 robust plane equations
- Rapid searching, sorting, and filtering of equations
- User customizable equation sets
- Full control of fit process, including goodness of fit criteria, minimization, and other options
- Robust plane fitting option
- Three robust fitting methods available for all nonlinear equations and user functions

USER-DEFINED FUNCTIONS (UDFs)
- UDF editor with push button help for inserting functions
- UDFs automatically compiled for speed
- Up to 15 UDFs can be fit at one time, each with up to 10 adjustable parameters
- Graphical UDF adjustment procedure for refining starting estimates
- UDFs can be saved as libraries

SURFACE-FIT ANALYSIS AND OUTPUT
Numerical:
- Improved Evaluation option with automated table generation, includes function, partial derivatives, roots, and cumulative volume; save evaluations to disk; evaluations are updated whenever an equation or algorithm is changed.
- Full numeric and statistical summary, including coefficients, standard error, confidence limits, ANOVA, goodness of fit, measured function minima and maxima
- Data summary with predicted values, residuals, and confidence/prediction limits
- Precision summary and term significance analysis

Graphical:
- Photorealistic Rendering with Full Spectrum.
- Surface-fit graph with customizable layout, backplanes, labels, grids, scaling, points, font, titles and resolution
- All customizations rendered in real time
- Fourteen types of gradient plots, Including one each for Excel, Lotus, and Quattro palettes
- Four types of shaded plots with full angular control of light source illumination
- Gradient and shaded plots use up to 32 colors
- Mesh resolution up to 120x120
- Contour plots can be added automatically
- Full animation of fitted surfaces

- Adjustable cache size and compression method (or surface-fit graphs)
- Confidence/prediction intervals (90, 95, 99%)
- 30 Residuals graphs

CODE GENERATION
- Fortran 77, C, QBasic, C++, JAVA, MATLAB and Pascal
- Function code or function code with full test routines
- Available for all built-in equations

OUTPUT AND EXPORT
- Publication-quality printed graphs
- Image formats include bitmaps, metafiles, enhanced metafiles and device-independent bitmaps
- File formats Include ASCII, Excel, Lotus, Quattro Pro and SigmaPlot-2000/2001

- *New in TableCurve 3D v4.0*
www.grafiti.com

System Requirements: Windows 3.1 with supplied Win32 libraries v1.30c, Windows 95/98/2000/NT/XP: 486 or higher; 33Mhz or higher; 8MB RAM (12MB recommended); 5MB free Hard Disk space.