

# Curve Fitting Toolbox 1.1

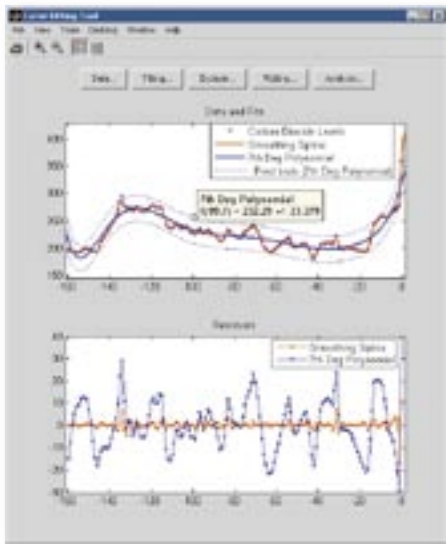
## Perform model fitting and analysis

The Curve Fitting Toolbox provides graphical user interfaces (GUIs) and command-line functions for a variety of curve-fitting applications. It includes integrated tools for previewing and preprocessing data, developing and comparing standard and custom models, fitting with standard and robust methods, and analyzing fits.

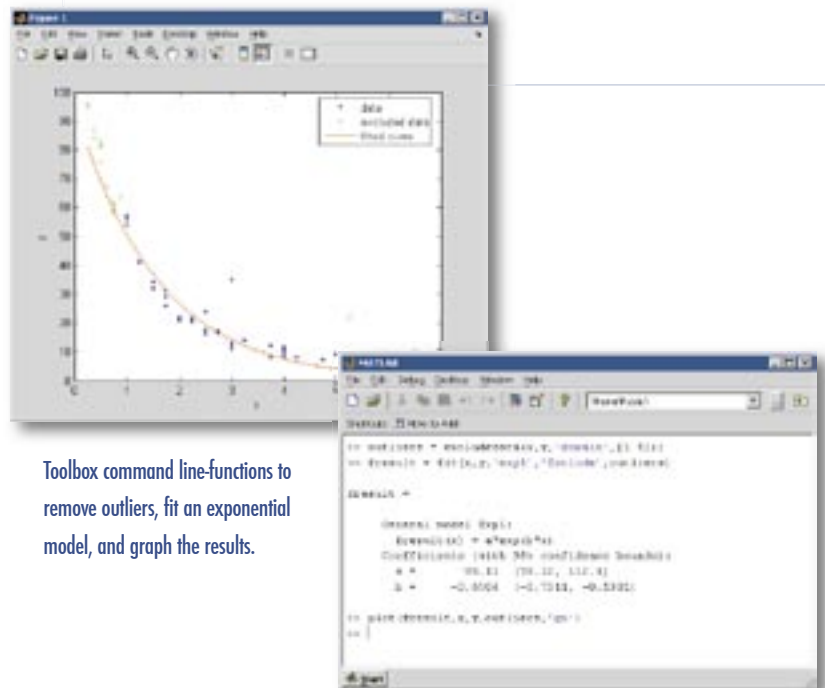
All Curve Fitting Toolbox functions are written in the open MATLAB® language. This means that you can inspect the algorithms, modify the source code, and create your own custom functions.

### KEY FEATURES

- Interactive graphical user interface that unifies key curve-fitting tasks
- Preprocessing routines, including data scaling, sectioning, smoothing, and removal of outliers
- Extensive library of linear and nonlinear parametric fitting models, with optimized starting points and solver parameters for nonlinear models
- Varied linear and nonlinear fitting methods, including least squares, weighted least squares, and robust fitting (all with or without bounds)
- Custom linear and nonlinear model development
- Nonparametric fitting using splines and interpolants
- Interpolation, extrapolation, differentiation, and integration of fits



Two data models and their residuals, including confidence intervals for one model. The Curve Fitting Tool provides a GUI to create, compare, manage, and analyze models.



Toolbox command line-functions to remove outliers, fit an exponential model, and graph the results.

## Working with the Curve Fitting Toolbox

You can access all the steps necessary to fit your data via a GUI and companion command-line functions. The Curve Fitting Tool lets you visually explore one or more data sets, create and manage fitting models and the display of results, analyze your fits, and save and recall fitting sessions.

## Previewing and Preprocessing Data

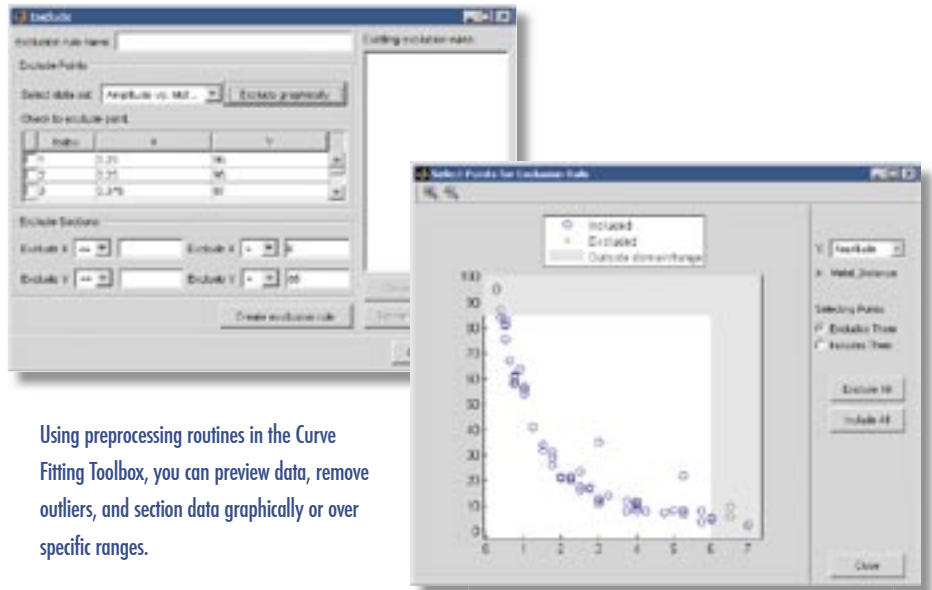
You can use MATLAB to import standard file formats and perform ASCII and low-level binary I/O and then load your data directly into the Curve Fitting Toolbox, where you can preview the data and perform a variety of preprocessing steps. The toolbox includes tools for identifying outliers and sectioning, excluding, and importing weights for your data. It also provides functions for smoothing, including:

- Moving average
- Savitzky-Golay
- Standard and robust Lowess
- Standard and robust Loess

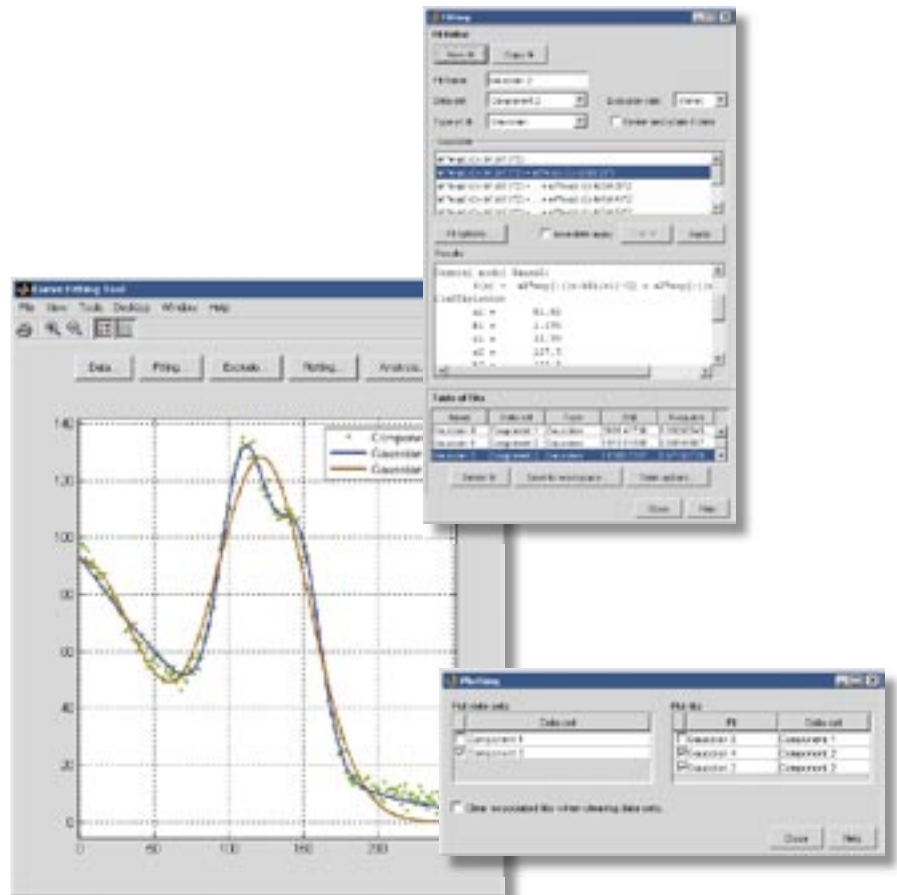
## Developing, Comparing, and Managing Models

With the Curve Fitting Toolbox, you can create a variety of standard and custom models and then compare results visually or through goodness-of-fit statistics. You can manage the addition of new models and compare all your results. You can also capture and automate fitting routines by generating MATLAB code.

With the Fitting Tool (top right), you can create and compare a variety of models. Using the Plotting Tool (bottom right) you can manage the data and models that you are viewing.



Using preprocessing routines in the Curve Fitting Toolbox, you can preview data, remove outliers, and section data graphically or over specific ranges.



## Fitting Models and Methods

The Curve Fitting Toolbox provides a library of linear, nonlinear, and nonparametric fitting models, including:

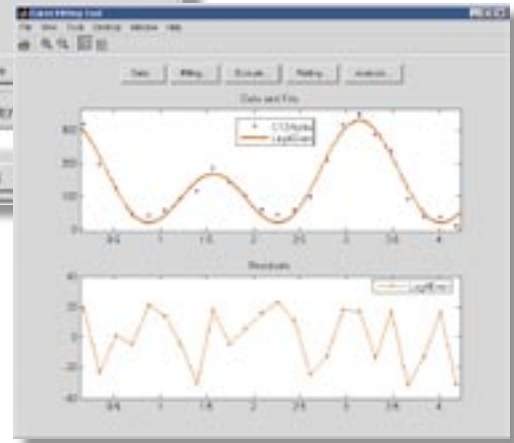
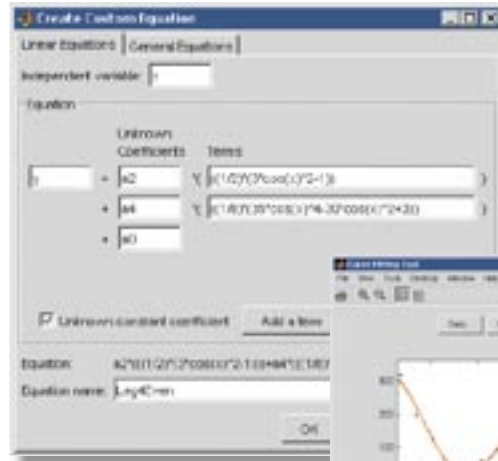
- Polynomial (to ninth degree)
- Exponential
- Rational (to degree 5/5)
- Peak (Gaussian)
- Distribution (Weibull)
- Fourier and power series
- Spline (cubic and smoothing)
- Interpolant (linear, nearest-neighbor, cubic-spline, shape-preserving)

All library models provide optimized solver parameters. Some nonlinear models compute optimized starting points. You can override default parameters, as well as develop your own set of custom models. In addition, you can save and reload an unlimited number of custom models for repeat use or further modification.

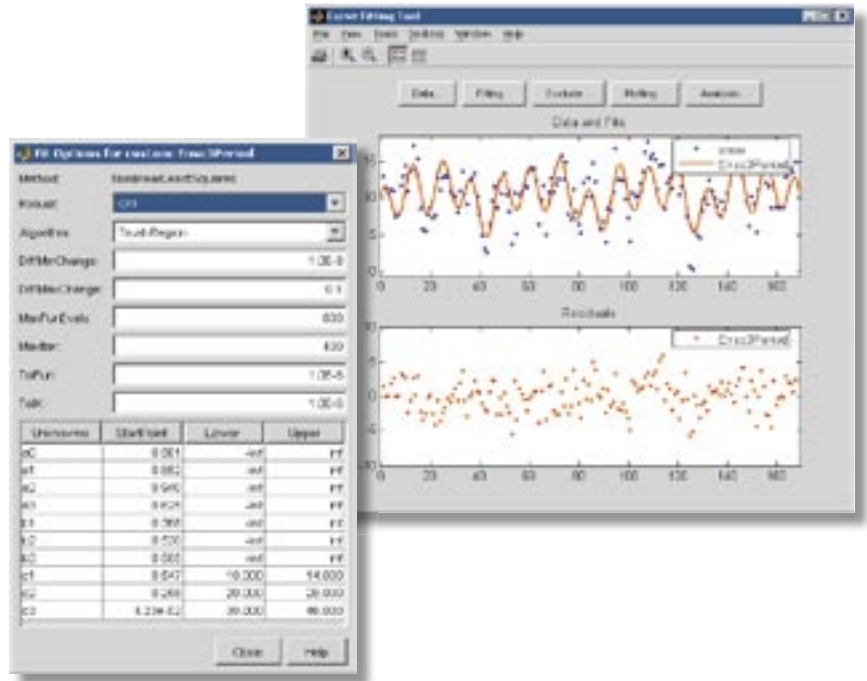
The Curve Fitting Toolbox provides a variety of fitting methods, including:

- Linear least squares
- Nonlinear least squares via trust region
- Levenberg-Marquardt
- Gauss-Newton algorithms

You can assign both weights and bounds on your coefficients. You can also choose two forms of robust fitting: bisquare or least absolute residual.



Custom linear and nonlinear models, developed using the Custom Equation Tool. The linear model (top) is a Legendre polynomial and the nonlinear model (bottom) is a Fourier series with an unknown frequency parameter.



## Analyzing Fits

To further assess your models, you can interpolate, extrapolate, differentiate, or integrate your fits over a specified data range. You can also establish confidence and prediction bounds. In all cases, you can visualize results or export data to the workspace for additional analyses.

## Required Products

MATLAB

## Related Products

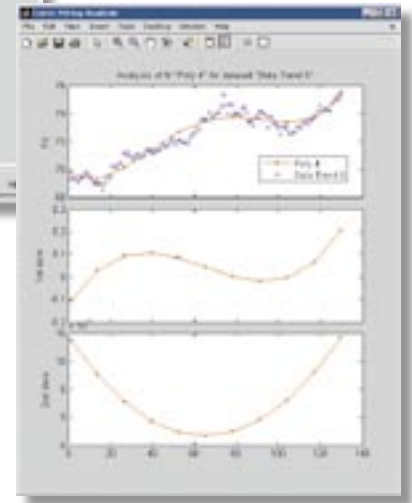
**Financial Toolbox.** Analyze financial data and develop financial algorithms

**Neural Network Toolbox.** Design and simulate neural networks

**Optimization Toolbox.** Solve standard and large-scale optimization problems



Plots of the first and second derivative for a fourth-degree model of a financial data set. The Analysis Tool lets you interpolate, extrapolate, differentiate, or integrate a fit.

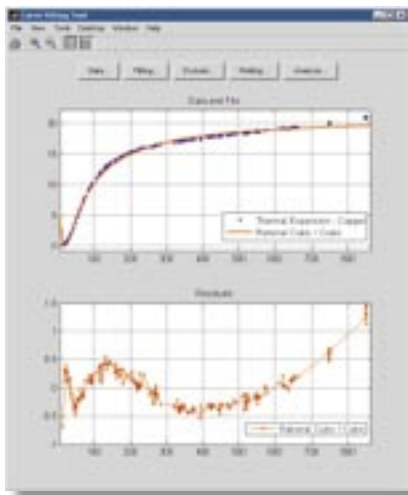


**Spline Toolbox.** Create and manipulate spline approximation models of data

**Statistics Toolbox.** Apply statistical algorithms and probability models

## Platform and System Requirements

For platform and system requirements, visit [www.mathworks.com/products/curvefitting/](http://www.mathworks.com/products/curvefitting/)



M-file of a fit, created using the automatic code generation feature in the Curve Fitting Toolbox. You can export your fits from the Curve Fitting Tool as commented code that can be used to automate fitting routines and preserve your work.

```

1 % Export the polynomial fit
2 function [coeffs, xdata, ydata] = export_fit(fitobj)
3 % coeffs: coefficients of the polynomial fit
4 % xdata: x-axis data points
5 % ydata: y-axis data points
6 %
7 % Create a plot to compare the fit to the data points
8 %
9 % Setting the axes:
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For demos, application examples, tutorials, user stories, and pricing:

- Visit [www.mathworks.com](http://www.mathworks.com)
- Contact The MathWorks directly
 

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