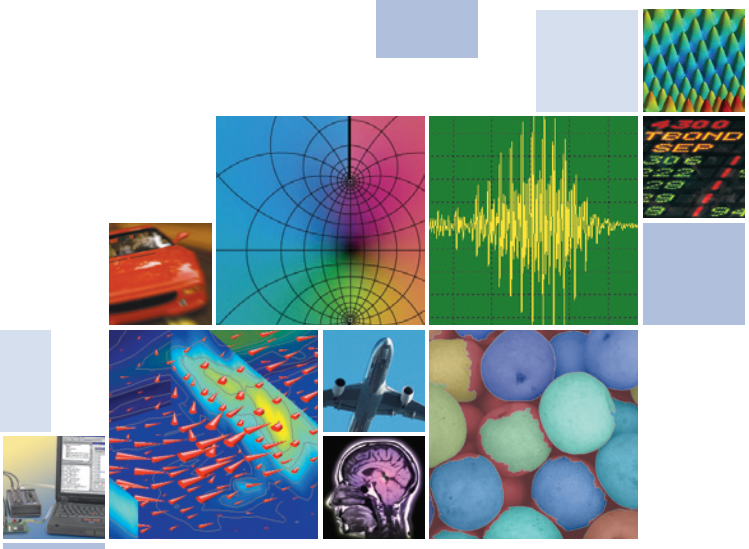
MathWorks™ Products

for Technical Computing



MATLAB®
&SIMULINK®

Accelerating the pace of engineering and science

The MathWorks™

The MATLAB® product family provides a flexible environment that enables engineers, scientists, and educators to accelerate their research, reduce analysis and development time, and deploy advanced applications.

"We could have programmed in C or C++, but it would have taken five to ten times longer."

— Richard Papasin,
NASA Ames Research Center

MATLAB® serves as the foundation for all MathWorks™ products. It includes a programming language and tools for algorithm development, data analysis, data visualization, and numeric computation. Add-on products extend MATLAB with application-specific tools for signal processing, image processing, statistics, optimization, and data acquisition.

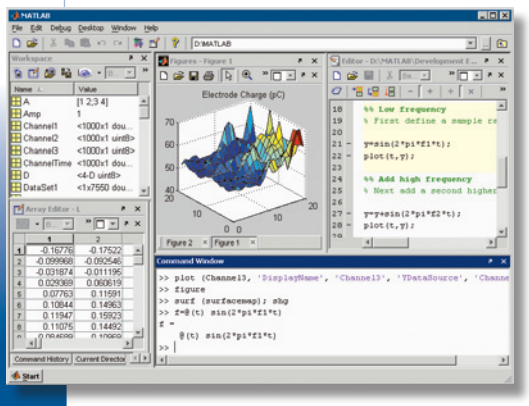
Algorithm Development and Programming

With the structured, high-level MATLAB language, you can program and develop algorithms faster than with traditional languages because you do not need to perform low-level administrative tasks, such as declaring variables, specifying data types, and allocating memory. Access to the source code enables you to customize the built-in algorithms. The interactive command-line interface lets you quickly iterate to the optimal solution.

Statistics and Data Analysis

The MATLAB product family supports the entire data analysis process. Interactive and command-line tools let you access and manipulate data and variables and perform matrix analysis. Preprocessing functions help section, scale, smooth, and filter data. Graphics capabilities include functions for volumetric data visualization, interactive tools for creating and manipulating 2-D and 3-D plots, and methods to export results to all popular graphics formats and desktop software.

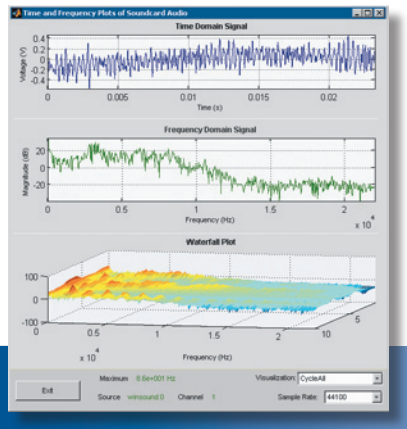
Additional products are provided for advanced Fourier analysis, zero and peak finding, descriptive statistics, fitting probability distributions, linear and nonlinear modeling, classification, and multivariate analysis. More specialized products support tasks such as neural network analysis, curve fitting, and spline modeling.



MATLAB® interface.

"MathWorks tools allowed us to thoroughly explore our data, understand it, and put together an optimal data analysis approach."

— Dr. Lorenzo Leonardi,
Institute for Biodiagnostics



Stand-alone spectrum analyzer application developed in MATLAB®.

"Writing code in MATLAB is at least 50 percent faster than in C, and even faster because most data analysis functions are available in the toolboxes."

— Jonathan Borg,
Hitachi Automotive

Math and Optimization

The MATLAB product family includes hundreds of mathematical functions for engineering and science. These functions are built upon LAPACK and BLAS, state-of-the-art linear algebra libraries. Combined with leading-edge methods, these highly optimized routines give you access to the fastest, most robust numerical routines available.

The mathematical libraries in MATLAB include functions for linear algebra, sparse matrix operations, ordinary differential equations, nonlinear optimization, and computational geometry. Specialized products are available for standard and large-scale optimization, symbolic math, and partial differential equations. These products give you a foundation for modeling and simulating complex mathematical systems.

Statistics and optimization tools.

Data Access and Acquisition

MATLAB includes tools for accessing data from files, other applications, databases, and external devices. You can read data from popular file formats; image, sound, and video files; and scientific files. You can call other applications and languages, such as C, C++, COM objects, DLLs, Java™, Fortran, and Microsoft® Excel®, and access data from ODBC/JDBC-compliant databases. Add-on products enable you to communicate with a variety of data and image acquisition hardware and instruments.

Application Development and Deployment

MATLAB provides development tools that help you work efficiently. These include a language-specific editor and debugger, performance profiling and code optimization tools, and interactive tools for developing graphical user interfaces.

You can either distribute stand-alone applications or integrate your MATLAB code with other applications. MATLAB applications can automatically be converted into C and C++ libraries, and into software components for Java, .NET, COM, and Excel.

Distributed Computing

You can substantially reduce execution time for computationally intensive MATLAB applications or work with larger data sets by running these applications on your computer cluster. For embarrassingly parallel problems, you can divide your algorithm into independent tasks that are run on a computer cluster. You can use either MPI-based functions or global array semantics (distributed arrays and parallel for-loops) for algorithms that can be decomposed into interdependent tasks.

CUSTOMER APPLICATIONS

NASA Ames
SPACECRAFT CONTROL SYSTEM
Makes spacecraft docking safer and more efficient

Toyota Racing Development
AUTOMOTIVE TEST DATA ANALYSIS
Improves vehicle performance

Los Alamos National Laboratory
REFLECTIVE WIRELESS COMMUNICATION SYSTEM
Reduces power requirements for wireless devices

Given Imaging
GASTROINTESTINAL IMAGING SYSTEM
Enables minimally invasive visual imaging of the small intestine

Woods Hole Oceanographic Institution
OCEANOGRAPHIC SURVEY SOFTWARE
Lets researchers survey extended areas of the ocean floor

Expersoft Systems AG
PORTFOLIO MANAGEMENT APPLICATION
Helps analysts forecast and respond to fluctuations in the stock market

GeoMechanics International
TOOLS FOR EFFICIENT OIL FIELD DRILLING
Minimize wellbore instability and increase oil extraction

Infinity Pharmaceuticals
AUTOMATED DRUG DATA ANALYSIS PROCESS
Supports the discovery of new cancer medicines

Learn more about these and other customer applications: www.mathworks.com/userstories

The MATLAB® product family supports key tasks in a broad range of applications.

Signal Processing and Communications

Develop signal processing algorithms using a comprehensive, proven collection of functions for filter design and analysis, signal analysis, communications, multirate signal processing, parametric modeling, and more. Generate waveforms and analyze signals with intuitive graphical tools and MATLAB programs.

Image Processing

Perform image acquisition, export, analysis, enhancement, manipulation, and visualization using the naturally expressive, matrix-based MATLAB language. Restore noisy or degraded images, enhance images for improved intelligibility, extract and measure features, and perform image registration.

Control System Design and Analysis

Model dynamic systems and perform classical and modern controller design to develop closed-loop control systems. Employ specialized control strategies, such as fuzzy logic and model predictive control.

Test & Measurement

Interface with data and image acquisition devices and instruments, and analyze and visualize the data. Develop and deploy stand-alone test and analysis applications.

Computational Biology

Perform mass spectrometry data analysis, microarray data analysis, sequence analysis, and statistical learning and classification. Study biological systems by modeling pharmacokinetics, physiological systems, and biochemical pathways. Read and write data to and from Web-based or internal databases, and deploy applications to scientists as stand-alone executables or Excel plug-ins.

Financial Modeling and Analysis

Optimize portfolios, conduct risk assessment, and perform equity and fixed-income research. Analyze data and create forecasts, run Monte Carlo simulations, calculate prices, determine cash flows, and perform other financial analyses. Develop new financial algorithms, and automatically create the components to integrate new models into your existing systems, including C, C++, Visual Basic®, and Excel.

Resources and Support

- *ONLINE USER COMMUNITY*
  www.mathworks.com/matlabcentral
- *DEMOS*
  www.mathworks.com/ltcdemos
- *PARTNER PRODUCTS*
  www.mathworks.com/connections
- *TECHNICAL SUPPORT*
  www.mathworks.com/support
- *TRAINING SERVICES*
  www.mathworks.com/training
- *BOOKS BASED ON MATLAB & SIMULINK*
  www.mathworks.com/books
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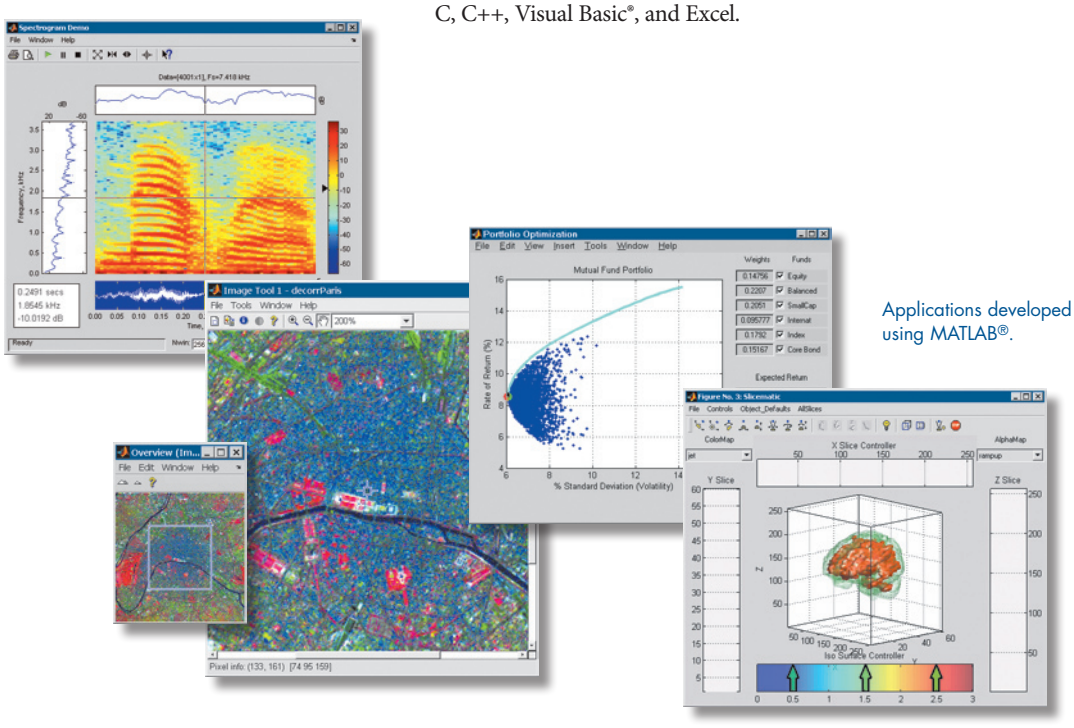

Applications developed using MATLAB®.

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