MATLAB®

The Language of Technical Computing

Computation

Visualization

Programming

Release Notes for Release 13

The MathWorks

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MATLAB Software Acknowledgments

MATLAB and/or its associated products include software developed by the following third parties.

ARnoldi PACKage (ARPACK)

Rich Lehoucq, Kristi Maschhoff, Danny Sorensen, and Chao Yang
`http://www.caam.rice.edu/software/ARPACK`

Assertion blocks were developed in cooperation with

Helmut Keller, Andreas Rau, and Joachim Boensch, members of the Control System Design (CSD) group at DaimlerChrysler Germany.

Automatically Tuned Linear Algebra Software (ATLAS)

R. Clint Whaley and Jack Dongarra
`http://www.netlib.org/atlas`

FDLIBM C math library for machines that support IEEE 754 floating-point

Developed at SunSoft, a Sun Microsystems, Inc. business, by Kwok C. Ng and others. FDLIBM is freely redistributable and is available through NetLib. For information about FDLIBM, see `http://www.netlib.org`.

`fft` and related MATLAB functions are based on the FFTW library

Developed by Matteo Frigo and Steven G. Johnson
Copyright © 1997-1999 Massachusetts Institute of Technology. All rights reserved.
Used under terms of a commercial license
`http://www.fftw.org`

HDF capability in the functions `imread`, `imwrite`, `imfinfo`, and `hdf` is based on code of which portions were developed at

The National Center for Supercomputing Applications at the University of Illinois at Urbana-Champaign.

JPEG capability in the functions `imread`, `imwrite`, `imfinfo`, `print`, and `saveas`

This software is based in part on the work of the Independent JPEG Group.

Linear Algebra PACKage (LAPACK)

`http://www.netlib.org/lapack` (for general information about LAPACK)
For details, see the *LAPACK User's Guide*.
E. Anderson, Z. Bai, C. Bischof, L. S. Blackford, J. Demmel, J. Dongarra, J. Du Croz, A. Greenbaum, S. Hammarling, A. McKenney, and D. Sorensen
For a printed version of the *LAPACK User's Guide*, go to `http://www.siam.org`.
For an online version of the *LAPACK User's Guide,* go to
`http://www.netlib.org/lapack/lug/lapack_lug.html`.

Qhull based computational geometry capability in MATLAB

Qhull copyright (c) 1993 The National Science and Technology Research Center for Computation and Visualization of Geometric Structures, The Geometry Center, University of Minnesota
e-mail: `software@geom.umn.edu`
For complete copyright information, issue the MATLAB command `help qhull`.

Sparse matrix minimum degree permutation functions `colamd` and `symamd`

TIFF capability in the functions `imread`, `imwrite`, `imfinfo`, `print`, and `saveas`:

Unsymmetric MultiFrontal PACKage (UMFPACK) for solving unsymmetric sparse linear systems.

Contents

Release Notes for Release 13

Release Notes for
Release 13

Introduction

There are two kinds of documents that describe what's new in Release 13:

• These Release Notes for Release 13
• Product-specific Release Notes

Release Notes for Release 13

The Release Notes for Release 13 give you a quick overview of what is new for Release 13.

The Release Notes for Release 13 include the following sections:

Printing the Release Notes for Release 13

If you are reading the Release Notes for Release 13 online and would like to print them out, you can link to a PDF version.

Product-Specific Release Notes

There is a set of Release Notes for almost every MathWorks product.

The product-specific Release Notes provide detailed information about the following topics (as applicable to each product):

- New features
- Major bug fixes
- Platform limitations
- Upgrading from an earlier release
- Known software and documentation problems

Access from the Help Browser

In the Help browser, the product-specific Release Notes are included in the set of documents/topics under each product in the Contents pane.

Also, if you are using the Help browser, you can use the "Quick Access to Product-Specific Release Notes" on page 41 of these Release Notes for Release 13 to link to the Release Notes for a specific product.

Access via the Web

You can also access product-specific Release Notes via the MathWorks Web site at `http://www.mathworks.com/access/helpdesk/help/helpdesk.shtml`, under the documentation set for each product.

Macintosh Platform Release Notes

The Macintosh-specific information for this release of MATLAB® is organized in one document, called Installing and Using MATLAB on Mac OS X. This document describes

- How to install and use MATLAB on the Mac
- Upgrading issues from previous versions of MATLAB for the Mac
- Differences between the UNIX and Mac versions of MATLAB
- Known problems and limitations with this release
- Troubleshooting information

In the Help browser, you can access Installing and Using MATLAB on Mac OS X under "Installation" near the top of the Contents pane.

Product Restructuring

Some existing products have been renamed or restructured in Release 13. The product restructuring involves changing the relationship of a product to other MathWorks products, restructuring functionality into multiple products, or renaming a product.

MATLAB Compiler

The MATLAB Compiler now includes the former MATLAB C/C++ Math and Graphics Libraries.

Developer's Kit for Texas Instruments DSP

The Developer's Kit for Texas Instruments™ DSP has been restructured into two products with distinct feature sets:

- MATLAB Link for Code Composer Studio™ Development Tools 1.0 — Use MATLAB with RTDX™-enabled Texas Instruments digital signal processors
- Embedded Target for TI TMS320C6000™ DSP Platform 1.0 — Deploy and validate DSP designs on Texas Instruments C6000 digital signal processors

Together, the products provide capability beyond what was provided by the former product, the Developer's Kit for Texas Instruments DSP 1.2

Power System Blockset

Starting with Release 13, the Power System Blockset has been renamed to SimPowerSystems.

Products with New Features or Major Bug Fixes

The tables below list the products that were updated for Release 13. For each product, the table indicates whether the update includes new features, bug fixes, or both. The new features for each product are briefly summarized following the tables below, and discussed in more detail in Release Notes for each product. Minor bug fixes are not documented.

Note Products not listed in the tables below do not have new features or major bug fixes added in Release 13. However, if you are updating to the Release 13 version of such a product from Release 12 or Release 11, you should refer to the Release Notes associated with Release 12.1 and/or Release 12. You can access those Release Notes in the online documentation set for each product, or via the "Quick Access to Product-Specific Release Notes" on page 41.

Products with new features or major bug fixes for Release 13 are presented in the following categories:

- "MATLAB Products" on page 6
- "Toolboxes" on page 6
- "Simulink Products" on page 7
- "Blocksets" on page 8

Note In addition to the products listed below, see "New Products" on page 26 for information about products introduced after Release 12.1.

MATLAB Products

Product	New Features	Major Bug Fixes
MATLAB 6.5	✔	✔
MATLAB Compiler 3.0	✔	
MATLAB Report Generator 1.3	✔	

Toolboxes

Product	New Features	Major Bug Fixes
Communications Toolbox 2.1	✔	✔
Control System Toolbox 5.2	✔	✔
Data Acquisition Toolbox 2.2	✔	✔
Excel Link 2.0	✔	
Filter Design Toolbox 2.2	✔	✔
Financial Derivatives Toolbox 2.0	✔	
Financial Time Series Toolbox 2.0	✔	✔
Image Processing Toolbox 3.2	✔	✔
Instrument Control Toolbox 1.2	✔	✔
Mapping Toolbox 1.3	✔	✔
Neural Network Toolbox 4.0.2		(Documentation update)
Optimization Toolbox 2.2	✔	✔
Signal Processing Toolbox 6.0	✔	✔
Spline Toolbox 3.1.1	✔	✔

Product	New Features	Major Bug Fixes
Statistics Toolbox 4.0	✔	✔
Virtual Reality Toolbox 3.0	✔	
Wavelet Toolbox 2.2	✔	✔

Simulink Products

Product	New Features	Major Bug Fixes
Simulink® 5.0	✔	✔
Real-Time Windows Target 2.2		(Documentation update)
Real-Time Workshop ® 5.0	✔	✔
Real-Time Workshop Embedded Coder 3.0	✔	✔
Requirements Management Interface 1.0.4	✔	✔
SimPowerSystems 2.3	✔	✔
Simulink Performance Tools 1.2	✔	✔
Simulink Report Generator 1.3	✔	
Stateflow® 5.0 and Stateflow® Coder 5.0	✔	✔
xPC Target 2.0	✔	✔

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Blocksets

Note In Release 13, the Power System Blockset has been renamed to SimPowerSystems.

Product	New Features	Bug Fixes
Communications Blockset 2.5	✔	✔
Dials & Gauges Blockset 1.1.2	(Documentation Enhancement)	
DSP Blockset 5.0	✔	✔
Fixed-Point Blockset 4.0	✔	

Highlights of Products with New Features and Enhancements

This section highlights the major new features and enhancements to existing products. The products are organized by the following categories:

- "MATLAB Products" on page 9
- "Toolboxes" on page 15
- "Simulink Products" on page 20
- "Blocksets" on page 23

MATLAB Products

MATLAB 6.5

JIT Accelerated MATLAB. One of the most significant features in MATLAB 6.5 is a new performance acceleration capability that speeds up the execution of functions and scripts in many M-file applications. The changes in how MATLAB processes functions and scripts provide a substantial performance increase over earlier MATLAB versions for many MATLAB applications.

Speeding up the execution of programs written in MATLAB is an ongoing endeavor that will be delivered over a number of product releases. The "Performance Acceleration" section of the MATLAB documentation explains how to best make use of the JIT Accelerator and how to use the MATLAB Profiler to optimize your performance. That section includes several sample programs to illustrate how you can make your M-file programs run faster.

Other new MATLAB features, documented in more detail in the MATLAB 6.5 Release Notes, are summarized in the following categories:

- "Development Environment" on page 10
- "Mathematics" on page 11
- "Programming and Data Types" on page 11
- "Programming Tips Documentation" on page 12
- "External Interfaces" on page 12
- "Graphics" on page 12
- "Creating Graphical User Interfaces" on page 12

Development Environment. This release introduces the Profiler, a new graphical user interface for assessing the performance of your M-files so you can make performance improvements. In addition to this new desktop tool, there are many enhancements to the existing tools, and some new and updated related functions. These include

- Use of Java Virtual Machine (JVM) Version 1.3.1 on Windows, Linux, and Solaris platforms
- **Start** button on the desktop for quick access to all tools
- Find dialog in the Command Window and Command History; incremental search feature in the Command Window and Editor
- Page setup options for printing from the Command Window, Command History, and Editor
- Autosave options and other new preferences and features for the Command History and Editor
- Display of line number, column number, and current function in the Editor
- Enhancements to the Array Editor, including spreadsheet-like behavior, the ability to exchange data with Microsoft Excel, and support for larger arrays
- New and updated functions for file system operations, such as `movefile`; new functions for exchanging files with the Internet, including ZIP and e-mail functions
- Access to Demos from the Help browser and support for Boolean operators in the Help browser **Search** feature
- Access from the **Web** menu to the MathWorks Web site including **Check for Updates** to view the latest version of MathWorks products, and MATLAB Central to download user-contributed M-files and participate in the `comp.soft-sys.matlab` user newsgroup
- Expanded Source Control Interface capabilities on PC platforms
- Notebook support for Word 2000 and 2002 (Office XP); support for Word 95 is discontinued.

Mathematics. Mathematics new features include

- Solution of delay differential equations
- Solution of singular boundary value ODE problems
- Integration over a volume
- Improved speed in core linear algebra functions for Pentium 4 (both Windows and Linux)
- Improved speed for
  - LU factorization and LU-based solve of sparse matrices
  - Matrix*vector, vector*matrix, and rowvector*columnvector operations
  - Matrix transpose
  - Full triangular solve

Programming and Data Types. In addition to the performance enhancements described above in "JIT Accelerated MATLAB" on page 9, MATLAB 6.5 also offers support for regular expressions, changes to `logical` and `sparse` in the MATLAB data types hierarchy, more control in warning and error handling, the ability to schedule execution of MATLAB commands, and new features in audio support.

Major features of this release are

- Significant performance improvements in M-file execution
- `logical` class attribute changed to a MATLAB class
- `sparse` class changed to a MATLAB class attribute
- Support for regular expressions
- Formatted strings in warning and error messages
- Individual control of warnings
- Dynamic field names for structures
- New logical `AND` and `OR` operators for short-circuiting
- More control in comparing structures, and arrays with `NaNs`
- 64-bit integer support
- Improvements to large data-set handling
  - 64-bit file handling
  - Less memory used to hold Boolean values

- MATLAB Timer object for scheduling MATLAB command execution
- Major enhancements to MATLAB Audio:
  - New function for obtaining audio device information
  - Enhancements to `audiorecorder` and `audioplayer`
  - 24-bit recording and playback on 32-bit Windows machines
  - 24- and 32-bit `.wav` file support
  - Workspace browser support

Programming Tips Documentation. The "MATLAB Programming Tips", a new feature documented in more detail in the MATLAB 6.5 Release Notes, is a categorized collection of tips on a wide range of topics. The tips include pointers into the MATLAB documentation for more complete coverage.

External Interfaces. MATLAB 6.5 offers many new features in MATLAB COM client support, including

- Several new MATLAB functions
- More robust memory management
- Added flexibility in event handling
- Enumerated values for properties
- Capability to add your own custom properties
- Graphical property and methods interfaces

Graphics. MATLAB 6.5 adds the following graphics features and enhancements:

- Colormap editor enables interactive colormap editing.
- New text properties provide control over the text background.
- Redesigned property editor accesses graphics properties with interactive editor.

Creating Graphical User Interfaces. MATLAB 6.5 adds the following features and enhancements to GUIDE:

- New structure for the generated M-files makes it easier to understand and program.

- GUI templates provide simple examples that you can modify for your own purposes. It is often easier to build a GUI from an existing template rather than starting with a blank GUI.
- Tab Order Editor enables you to change the order in which GUI components are selected by tabbing.
- Export option in the File menu enables you to export a GUI to a single stand-alone M-file.
- MATLAB Editor icon on the toolbar provides easier access to the editor.

MATLAB Compiler 3.0

New MATLAB Compiler features, documented in more detail in the MATLAB Compiler 3.0 Release Notes, include

- The MATLAB C/C++ Math and Graphics Libraries being included with the Compiler
- A new optimization that improves performance whenever the run-time types of variables match what is expected
- The ability to create COM components from MATLAB M-files

MATLAB Report Generator 1.3

New MATLAB Report Generator features, documented in more detail in the MATLAB and Simulink Report Generator 1.3 Release Notes, include support for specifying table column widths with the MATLAB Cell Table component.

MATLAB Licensing

Two new features relate to MATLAB licensing:

- MATLAB "heartbeat" time-out
- New `license` command features, including listing licenses in use

Heartbeats. The license manager now releases all of the licenses associated with a particular MATLAB session if it does not receive "heartbeat" messages from the MATLAB client. By default, the license manager waits 2 hours before releasing licenses.

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This time-out will be reached if the client machine crashes and cannot release the license, or if the machine is removed from the network (unplugged). If MATLAB reestablishes its connection to the license server after its licenses are released, they will be checked out again. When you suspend MATLAB using **Ctrl+Z**, the heartbeat thread is still active and continues to maintain the connection to the license server.

Note Multithreaded heartbeats are not supported on ALPHA, HP700, or IBM RS6000.

New license Command Features. The MATLAB `license` command now supports two new capabilities:

- Obtaining a list of licenses currently in use
- Identifying if a particular product is licensed

To use the MATLAB `license` command to obtain a list of all licenses currently in use, use this syntax

```
result = license('inuse');
```

You can also use the `license` command to check if you have a license for a particular product.

```
result = license('test', product_name);
```

You must use the product name abbreviation as it appears in the `INCREMENT` line in your License File (`license.dat`). For example, the product name for the the System Identification Toolbox is `Identification_Toolbox`. Note that product names are case sensitive.

Toolboxes

Communications Toolbox 2.1

New Communications Toolbox features, documented in more detail in the
Communications Toolbox 2.1 Release Notes, include

- New data type that supports computations in Galois fields having 2^m
  elements
- Enhanced support for Reed-Solomon encoding and decoding, including
  shortened codes
- New support for arithmetic encoding and decoding

Control System Toolbox 5.2

New Control System Toolbox features, documented in more detail in the
Control System Toolbox 5.2 Release Notes, include

- SISO Design Tool
  - New feedback structures
  - A new **Analysis** menu for loop responses, including new input and output
    disturbance plots
  - Seamless importation of models from the System Identification Toolbox
- LTI Viewer
  - Unrestricted import of MIMO LTI models with unequal numbers of inputs
    and/or unequal numbers of outputs
  - The zoom property has been removed from the right-click menu and is now
    located on a new toolbar.
  - Seamless importation of models from the System Identification Toolbox
- Response Plots
  - Normalization of time plots for easy trend comparison
  - Driving input signal shown in linear simulation (lsim) plots
  - Standard zooming with all response plots
  - A new function, iopzmap, that maps poles and zeros for I/O pairs

Data Acquisition Toolbox 2.2

New Data Acquisition Toolbox features, documented in more detail in the Data Acquisition Toolbox 2.2 Release Notes, include

- Support for Keithley hardware
- Support for the parallel port
- The data acquisition Oscilloscope GUI for streaming data into a graphical display
- Ability to configure properties and view information associated with device objects using the MATLAB Workspace browser

Excel Link 2.0

New Excel Link features, documented in more detail in the Excel Link 2.0 Release Notes, include support for Windows 2000 and two new data management functions.

Filter Design Toolbox 2.2

New Filter Design Toolbox features, documented in more detail in the Filter Design Toolbox 2.2 Release Notes, include

- Additional filter transformation functions
- Updated quantized filter structures
- Enhanced minimum phase filter design functions
- New filter design functions
- Support for word lengths greater than 53 bits, up to the memory available on your machine
- New quantizer error analysis functions

Financial Derivatives Toolbox 2.0

New Financial Derivatives Toolbox features, documented in more detail in the Financial Derivatives Toolbox 2.0 Release Notes, include adding support for the Black-Derman-Toy (BDT) model for pricing interest rate derivatives.

Financial Time Series Toolbox 2.0

New Financial Time Series Toolbox features, documented in more detail in the Financial Time Series Toolbox 2.0 Release Notes, include

- Support for financial time series objects incorporating time-of-day information (hourly and minute time series)
- Improved displays produced by `chartfts` and `ftsgui`

Image Processing Toolbox 3.2

New Image Processing Toolbox features, documented in more detail in the Image Processing Toolbox 3.2 Release Notes, include

- Support for the new MATLAB `logical` data type. Toolbox functions that return binary images now use this new data type. In previous releases, binary images were returned as `uint8` arrays with the logical flag set.
- Support for writing MATLAB data in DICOM format with the new `dicomwrite` function

Instrument Control Toolbox 1.2

New Instrument Control Toolbox features, documented in more detail in the Instrument Control Toolbox 1.2 Release Notes, include

- Support for networked instruments using the TCP/IP or UDP protocol
- Support for Rohde & Schwarz hardware using the VISA standard
- Configuration of instrument object properties with the property inspector
- Configuration of properties and view information associated with instrument objects using the MATLAB Workspace browser

Mapping Toolbox 1.3

New Mapping Toolbox features, documented in more detail in the Mapping Toolbox 1.3 Release Notes, include

- New and enhanced map display functions
- Updated atlas data

Optimization Toolbox 2.2

New Optimization Toolbox features, documented in more detail in the Optimization Toolbox 2.2 Release Notes, include Trust-region dogleg algorithm for solution of medium-scale systems of equations.

Signal Processing Toolbox 6.0

New Signal Processing Toolbox features, documented in more detail in the Signal Processing Toolbox 6.0 Release Notes, include

- Object-oriented digital filter object (`dfilt`) and window (`sigwin`) objects
- Window Design and Analysis Tool for designing and comparing windows
- Window Visualization Tool for displaying windows
- New functions for
  - Windows—Parzen and Flat Top
  - Filters—FIR Gaussian
  - Filter analysis—new phase response, phase delay, and zero-phase response functions; improved group delay response accuracy; and step response availability from the command line
  - Coefficient ordering—digit reversal ordering
- Major enhancements to the Filter Design and Analysis Tool (FDATool) and to the Filter Visualization Tool (FVTool)
- Spectral estimation demo

Spline Toolbox 3.1.1

New Spline Toolbox features, documented in more detail in the Spline Toolbox 3.1.1 Release Notes, include

- Creation of smoothing splines for ungridded bivariate data, $z = f(x, y)$, using thin-plate splines; also creation of the first and second order derivatives
- For the Spline Toolbox GUI, generation of an M-file that reproduces the current figure
- Finding the roots of the univariate spline in a given function
- Obtaining the minimum or maximum value of the univariate spline and its location in a given function

Statistics Toolbox 4.0

New Statistics Toolbox features, documented in more detail in the Statistics Toolbox 4.0 Release Notes, include

- Decision trees for nonparamentric regression and classification
- Maximum likelihood factor analysis
- K-means clustering
- Classical multidimensional scaling
- Canonical correlation analysis
- Central composite and Box-Behnken designs
- Wishart matrices and latin hypercube sampling

Virtual Reality Toolbox 3.0

New Virtual Reality Toolbox features, documented in more detail in the Virtual Reality Toolbox 3.0 Release Notes, include

- Support for both PC and UNIX/Linux platforms
- New internal viewer that you can use to view virtual worlds
- Faster communication between the Virtual Reality Toolbox and VRML-enabled Web browsers

Wavelet Toolbox 2.2

New Wavelet Toolbox features, documented in more detail in the Wavelet Toolbox 2.2 Release Notes, include

- New wavelet energy function
- Ability to load `.wav` and `.au` files directly into the Wavelet Toolbox GUI

Simulink Products

Simulink 5.0

New Simulink features, documented in more detail in the Simulink 5.0 Release Notes, include

- Support for fixed-point arithmetic
- Look-Up Table Editor
- Signal Builder block
- Rate Transition block
- Reorganized block library
- Invalid loop highlighting
- Conditional branch execution optimization
- Enhanced Diagnostic Viewer
- Enhanced Mask Editor
- Support for symbols and Greek letters in annotations and block icons

Real-Time Windows Target 2.2

New Real-Time Windows Target features, documented in more detail in the Real-Time Windows Target 2.2 Release Notes, include these newly documented blocks:

- Counter Input
- Encoder Input

Real-Time Workshop 5.0

In addition to numerous bug fixes, Real-Time Workshop features, documented in more detail in the Real-Time Workshop 5.0 Release Notes, include

- New Getting Started Guide and revised User's Guide
- Code reuse for nonvirtual subsystems
- Increased support for External mode
- More compact code produced by GRT
- Simplified packaging of generated files

Real-Time Workshop Embedded Coder 3.0

New Real-Time Workshop Embedded Coder features, documented in more detail in the Real-Time Workshop Embedded Coder 3.0 Release Notes, include

- New User's Guide
- Auto-generated main program
- External mode support
- Generation of reentrant model code
- Revised packaging of generated files
- Support of both ANSI and ISO floating-point math libraries

Requirements Management Interface 1.0.4

The Requirements Management Interface works with the latest DOORS release, DOORS 5.2, as well as all earlier DOORS versions.

Simulink Performance Tools 1.2

New Simulink Performance Tools include an enhanced **Coverage Settings** dialog box for the Model Coverage Tool and performance improvements to the Graphical Merge Tool. These enhancements are documented in more detail in the Simulink Performance Tools 1.2 Release Notes.

Simulink Report Generator 1.3

New Simulink Report Generator features, documented in more detail in the MATLAB and Simulink Report Generator 1.3 Release Notes, include

- New Simulink Block Type: Documentation component, which inserts text extracted from Doc blocks in Simulink models into a report
- Improved images of multiple black and white traces with the Simulink Block Type: Scope Snapshot component
- Specifying titles of Simulink diagrams and the size of the Simulink diagrams with the Simulink Scope Snapshot component
- Reporting on the Pre-Lookup table with the Simulink Block Type: Look-Up Table component
- Specifying titles for Stateflow diagrams with the Stateflow Snapshot component

SimPowerSystems 2.3

The Power System Blockset has been renamed to SimPowerSystems starting with Release 13. As a part of the Physical Modeling family, SimPowerSystems and SimMechanics work together with Simulink to model electrical, mechanical, and control systems.

New SimPowerSystems features, documented in more detail in the SimPowerSystems 2.3 Release Notes, include

- Generalized phasor solution for almost any circuit
- New blocks and enhanced features in the Electrical Sources, Elements, Power Electronics, and Machines libraries and the Powergui block

Stateflow 5.0 and Stateflow Coder 5.0

New Stateflow and Stateflow Coder features, documented in more detail in the Stateflow 5.0 and Stateflow Coder 5.0 Release Notes, include

- Fixed-point support
- An undo operation in the Stateflow diagram editor
- An application program interface (API) to Stateflow diagrams
- Matrix support (two-dimensional) for data input from and data output to Simulink
- A comprehensive "Print Details…" report of objects in Stateflow diagrams
- Charts that can export graphical functions to other charts in a Simulink model

xPC Target 2.0

New xPC Target features, documented in more detail in the xPC Target 2.0 Release Notes, include

- xPC Target GUI for interacting with a target application
- Application program interface (API) with COM objects for creating your own custom GUI applications that communicate with a target application
- Drivers for over 100 additional I/O boards
- Polling mode for faster I/O device handling
- Enhanced data logging and tracing

Blocksets

Communications Blockset 2.5

New Communications Blockset features, documented in more detail in the Communications Blockset 2.5 Release Notes, include

- RF Impairments library that provides blocks to model RF impairments to a baseband signal
- Signal Generators sublibrary of Comm Sources that provides blocks that generate sequences for spreading or synchronization in a communication system
- Three new scopes in the Comm Sinks library that display enhanced eye and scatter diagrams, scatter plots, and signal trajectories
- CRC sublibrary of the Error Detection and Correction library that contains blocks for appending cyclic redundancy check (CRC) bits to data and for detecting errors in transmission
- Enhancements to Reed-Solomon blocks in the Block sublibrary of the Error Detection and Correction library that provide a wider range of available codes
- WCDMA demo that provides a model of a wide-band code division multiple access (WCDMA) communication system

Dials & Gauges Blockset 1.1.2

The Dials & Gauges Blockset includes some new example models in the documentation and some important bug fixes, as documented in more detail in the Dials & Gauges Blockset 1.1.2 Release Notes.

DSP Blockset 5.0

New DSP Blockset features, documented in more detail in the DSP Blockset 5.0 Release Notes, include

- Full support of single-precision and Boolean data types
- Expanding support of fixed-point data types
- Full support of embedded real-time (ERT) ANSI C code generation
- Optimized generated ANSI C code through use of run-time functions

- New blocks:
  - Cumulative Product
  - Digital Filter
  - DWT and IDWT
  - Interpolation
  - LPC to LSF/LSP Conversion (and its inverse)
  - Two-Channel Analysis Subband Filter (and the synthesis version)
- Block enhancements:
  - New 24- and 32-bit support in the audio I/O blocks
  - New optimization options in Autocorrelation, Correlation, Convolution, DCT and IDCT blocks
  - Digital Filter Design block support for more filter structures
  - Enhancements and new options in the Dyadic Analysis Filter Bank and Dyadic Synthesis Filter Bank blocks
  - Better random signal generation by the Random Source block, which has a new option

Fixed-Point Blockset 4.0

New Fixed-Point Blockset features, documented in more detail in the Fixed-Point Blockset 4.0 Release Notes, include

- Installation whenever Simulink is installed
  - Models with Fixed-Point Blockset blocks can now be shared among all Simulink users in your organization, whether or not they have a Fixed-Point Blockset license.
  - Two simple global settings, data type override and logging modes, allow you to easily toggle a model between taking full advantage of fixed-point features, or running without a Fixed-Point Blockset license.
- Unification of core Simulink and Fixed-Point Blockset blocks
- Global availability of data type override and logging modes
- New Shift Arithmetic block

Power System Blockset

Note In Release 13, the Power System Blockset has been renamed to SimPowerSystems to reflect its future full integration with SimMechanics into the Physical Modeling product family.

New Products

The following products are new since Release 12.1. You can link to the Release Notes for each product below for an introduction to that product. These products are listed in the following categories:

- "MATLAB" on page 26
- "Toolboxes" on page 27
- "Simulink" on page 28
- "Blocksets" on page 28

MATLAB

There are three new or restructured MATLAB products for Release 13. Note that the MATLAB Excel Builder was introduced prior to Release 13, in Web-downloadable form.

MATLAB COM Builder

The MATLAB COM Builder 1.0 is an extension to the MATLAB Compiler that enables customers to automatically convert MATLAB applications to Common Object Model (COM) objects. Developers can do modeling and analysis in MATLAB and convert the models to ready-to-use COM objects. These objects can be immediately integrated with any COM-based application.

MATLAB Excel Builder

MATLAB Excel Builder provides the capability to incorporate MATLAB models and functions quickly in Excel worksheets. A graphical user interface enables you to build and deploy Excel Add-Ins containing functionality designed in MATLAB but accessed from the Excel environment.

MATLAB Link for Code Composer Studio™ Development Tools

The MATLAB Link for Code Composer Studio™ Development Tools simplifies software analysis and verification for TI digital signal processors (DSP) by allowing you to communicate between your TI software development environment and real-time DSP hardware, and MATLAB. Using MATLAB Link for Code Composer Studio™ eliminates the software gap between DSP algorithm research and implementation by enabling algorithm developers, system designers, and embedded engineers to test, validate, and visualize DSP software in MATLAB.

Note The Developer's Kit for Texas Instruments™ DSP has been repackaged as two separate products: the MATLAB Link for Code Composer Studio™ Development Tools and the Embedded Target for TI TMS320C6000™ DSP Platform (discussed in the "Blocksets" on page 28). See the discussion of that repackaging in the section called "Developer's Kit for Texas Instruments DSP" on page 4.

Toolboxes

There are two new toolboxes included in Release 13. Both these new toolboxes were introduced in Web-downloadable form after Release 12.1.

Curve Fitting Toolbox

The Curve Fitting Toolbox provides a central access point and a graphical user interface (GUI) for the functions you need to perform applications that involve curve fitting. The toolbox provides routines for preprocessing data, as well as creating, comparing, analyzing, and managing models.

Model-Based Calibration Toolbox

The Model-Based Calibration Toolbox provides design tools for the calibration of powertrain systems. The toolbox is built on the high-performance technical computing environment of MATLAB, as well as the simulation capabilities of Simulink. The Model-Based Calibration Toolbox reduces dynamometer testing time, increases engineering productivity, saves calibration time, and has the potential to improve powertrain performance and reliability.

Simulink

There are two new Simulink products included in Release 13. Both these new products were introduced in Web-downloadable form after Release 12.1.

Embedded Target for Motorola MPC555

The Embedded Target for Motorola® MPC555 lets you deploy production code generated from Real-Time Workshop Embedded Coder directly onto the MPC555 microcontroller. The Embedded Target for Motorola MPC555 relies on Real-Time Workshop Embedded Coder for production code generation, and provides code that is specific to the Motorola MPC555.

SimMechanics

With SimMechanics, you can directly model mechanical components (bodies and joints), simulate their motion, and analyze the results without having to derive the mathematical equations governing the system. Modeling mechanical systems and their controllers together in the Simulink environment eliminates many design defects and shortens the design cycle.

Note SimMechanics 1.1, the version on the Release 13 CD, includes some significant enhancements to SimMechanics 1.0 that was introduced in Web-downloable form.

Blocksets

Aerospace Blockset

The Aerospace Blockset provides reference models and utilities to accelerate the development and integration of system and subsystem models for aircraft, spacecraft, missiles, satellites, weapons, and unmanned airborne vehicles (UAVs). The reference models contain environmental specifications for gravity, atmosphere, and wind and let you spend more time designing more specific vehicle tasks.

In addition, the Aerospace Blockset includes blocks that provide essential calculation components and representation models to aid in the verification and visualization of the entire system design.

Note The Aerospace Blockset was introduced after Release 12.1 in Web-downloadable form. It is now on the Release 13 CD.

Embedded Target for TI TMS320C6000™ DSP Platform

The Embedded Target for TI C6000 DSP Platform eliminates the software gap between DSP algorithm research and implementation on TI digital signal processors by helping algorithm developers, system designers, and embedded applications engineers create, validate, and deploy DSP software for the TI C6000 family of DSPs in less time.

Note The Developer's Kit for Texas Instruments™ DSP has been repackaged as two separate products, including the Embedded Target for TI TMS320C6000™ DSP Platform. See the discussion of that repackaging in the section called "Developer's Kit for Texas Instruments DSP" on page 4.

Maximum Name Length Changed for Variables, Functions, Files

Prior to this release, the length of MATLAB identifiers (variable names, function and subfunction names, structure field names, M-file names, MEX-file names, and MDL-file names) was restricted to 31 characters. Names using more than 31 characters were either truncated by MATLAB or caused a warning or error to be generated.

In MATLAB 6.5, any of these names can be up to 63 characters long.

A new function, `namelengthmax`, returns the maximum length for MATLAB identifiers.

```
namelengthmax
ans =
    63
```

If you have MATLAB programs that hard-code the maximum identifier length as 31, you should replace these hard-coded limits with a call to `namelengthmax`.

If you use identifiers that exceed 63 characters, MATLAB issues a warning and truncates any characters beyond the 63rd.

Characters Beyond 31 Are No Longer Ignored

In previous versions of MATLAB, if you had two or more long identifiers in which the first 31 characters were identical, MATLAB ignored any characters beyond the 31st and thus recognized only one of the identifiers. For example, given these two Stateflow filenames

```
stateflow_modelname_with_40_characters_1.mdl
stateflow_modelname_with_40_characters_2.mdl
```

both appeared to MATLAB 6.1 as shown below, and MATLAB recognized only one of the files.

```
stateflow_modelname_with_40_cha.mdl
```

In MATLAB 6.5, with the maximum MDL-file name length increased to 63, MATLAB recognizes both files. You should be aware of this change, as it could possibly lead to unexpected behavior.

Warning for Identifiers Longer Than 31

In MATLAB 6.5, if you use an identifier that exceeds the previous limit of 31 characters, MATLAB can optionally generate a warning of the form:

```
<identifier> exceeds MATLAB's previous maximum name length limit
of 31 characters.
```

This warning is disabled by default. You can enable it by typing

```
warning on MATLAB:usinglongnames
```

Note Unlike most MATLAB warnings, you cannot enable this warning with the commands, `warning on` or `warning on all`. You must use the command shown above.

Warning for Identifiers Longer Than namelengthmax

If you specify an identifier that exceeds the new character limit, MATLAB generates the following warning:

```
<identifier> exceeds MATLAB's maximum name length of
<namelengthmax> characters and has been truncated to
<truncated_identifier>
```

This warning is enabled by default. You can disable it by typing the following command. However, we strongly encourage you to leave it enabled:

```
warning off MATLAB:namelengthmaxexceeded
```

MATLAB Toolbox Functions Updated

MATLAB toolbox functions, such as `isvarname`, have been updated in MATLAB 6.5 to make use of the `namelengthmax` function, and thus return the correct values.

Effect on P-Code and MEX-Files

You should recompile the following files:

- Any P-code files that contain identifiers longer than 31 characters
- Any MEX-files that use the constant, `mxMAXNAME`

Platform Limitations

For Release 13, all the features described in these Release Notes and in the Release 13 documentation are supported in *full* for the following platforms:

- Microsoft Windows XP, Windows 2000, Windows NT, Windows 98, and Windows Millenium Edition
- Compaq Alpha
- Linux
- SGI
- Sun Solaris

The MathWorks Web site provides a complete description of system requirements for MathWorks products.

Note As in Release 11 and Release 12, there are some minor differences between Windows and UNIX for specific tools, as documented for those tools.

Macintosh Platform Release Notes

The Macintosh-specific information for this release of MATLAB® is organized in one document, called Installing and Using MATLAB on Mac OS X. This document describes

- How to install and use MATLAB on the Mac
- Upgrading issues from previous versions of MATLAB for the Mac
- Differences between the UNIX and Mac versions of MATLAB
- Known problems and limitations with this release
- Troubleshooting information

In the Help browser, you can access Installing and Using MATLAB on Mac OS X under "Installation" near the top of the Contents pane.

Windows 95 No Longer Supported

MathWorks products in Release 13 no longer support Microsoft Windows 95.

Note In the next major release, The MathWorks will discontinue support for Windows 98 and Millenium Edition (ME). We do not recommend using Windows 98 or ME and strongly encourage migration to Windows 2000 or Windows XP at your earliest convenience.

Differences for the HP and IBM Platforms

Because of problems with the Java VM, there are limitations for MATLAB on the HP and IBM platforms.

Platform	Limitations
HP 11.0 (HP UX) IBM	Graphical user interfaces that are based on Java, such as the MATLAB desktop, are not available. Access to Java from MATLAB is supported.
HP 10.2 (HP 700)	Java-based tools and applications are not supported.

Alternatives for most tools are available and are documented in the following table. The table summarizes the products with limitations for these platforms.

Note The platform limitations for Release 13 include the same limitations as existed in Release 12 (with the exception of the Filter Design Toolbox, which no longer has platform limitations on HP and IBM). In addition, some new graphical user interfaces added in Release 13 have limitations on the HP and IBM platforms.

For details on limitations and the alternatives, see the sections of the online version of the Release Notes for the product(s) of interest to you. If a product is *not* listed in the following table, it has no platform limitations.

Product	Limitations on HP and IBM Platforms
MATLAB	
• Development Environment	The MATLAB desktop and many of its tools are not supported. For details, see "Development Environment Limitations" in the MATLAB Release Notes.
• Mathematics	The Basic Fitting interface is not supported. Instead, use the command line curve fitting capabilities.
• Graphics	The Property Editor and Data Statistics tools are not supported. For details, see "Graphics Limitations" in the MATLAB Release Notes.
	To print, use the Release 11 **Page Setup**, **Print Setup**, and **Print** dialog boxes.
• GUIDE	Not supported. Instead, use functions to create graphical user interfaces.

Product	Limitations on HP and IBM Platforms
Toolboxes	
Control System Toolbox	The Toolbox Preferences Editor and Response Property Editor are not supported. The LTI Viewer Preferences Editor is supported with a reduced set of features (no tools to set preferences for grids, fonts, colors, or phase wrapping). The following features are not supported for the SISO Design Tool: • Preference and property editing • Compensator Format editing • Storing and retrieving compensators In addition, the SISO Tool Export window has fewer choices available for export.
Database Toolbox	Not supported on the HP 10.2 (HP 700) platform.
Image Processing Toolbox	The `cpselect` GUI is not supported.
Neural Network Toolbox	The Neural Network Tool, a graphical user interface for the Neural Network Toolbox, is not supported. You can achieve the same functionality by using the MATLAB Command Window.
Virtual Reality Toolbox	Not supported on HP and IBM.

Product	Limitations on HP and IBM Platforms
Simulink Products	
Simulink	The following Simulink features are not supported: • Simulink Editor's **Find** dialog. Use the `find_system` command instead. • GUI interface to the Simulink Debugger. Use the command-line interface instead. • The **View Changes** dialog box for modified library links. See the "Platform Limitations" section of the Simulink Release Notes for an alternative. • **Parameter** dialog for the Configurable Subsystem block. Use the `set_param` command instead to set the block's parameters. • New version of the Mask Editor • New version of the Diagnostic Viewer • Model Discretizer • **Print Details** dialog • Simulink print-as-book feature • Simulink Data Class Designer • S-Function Builder
Real-Time Workshop	Instead of the **Model Parameter Configuration** dialog box, the **Tunable Parameters** dialog box is used.
Simulink Performance Tools	The Model Differences Tool is not supported.
Requirements Management Interface	Not supported.

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Product	Limitations on HP and IBM Platforms
Blocksets	
DSP Blockset	Same limitations as Simulink.

Problems Entering Accented Characters on Linux

On Linux platforms, using an accent key to accent a character in a two-stroke sequence in a MATLAB window, such as ^e for ê or ~n for ñ, may cause MATLAB to hang. To avoid this problem in MATLAB, use `matlab -nodesktop`.

With Simulink, avoid the use of these keystrokes. To use characters such as the caret ^ when it is mapped as a dead-accent key, you must paste it into the MATLAB IDE from a non MATLAB window, such as an xterm, or use the `power` and `mpower` functions directly.

Problems Entering Accented Characters on UNIX Platforms

Keys for accented characters, such as Ü on German keyboards and Å on Swedish keyboards, are ignored in the IDE. Pasting these characters into MATLAB windows results in the character value 128 instead of the actual character value. For example, pasting the string `double( ¯˘      )` into MATLAB appears as

```
double(' ')
ans =
128    128    128    128    128    128    128
```

Installation Notes

For Release 13 the organization of product software and documentation on the UNIX CDs has been changed. There is no longer a separate Documentation CD. Instead, the products have been divided up between three CDs, with the software and documentation for each product packaged together on the same CD.

The following tables list the contents of each of the three Release 13 UNIX CDs.

Contents of UNIX CD 1	
MATLAB	MATLAB Runtime Server

Contents of UNIX CD 2	
Aerospace Blockset	SB2SL
CDMA Reference Blockset	SimMechanics
Communications Blockset	SimPowerSystems
Communications Toolbox	Simulink
DSP Blockset	Simulink Performance Tools
Fixed-Point Blockset	Stateflow
Nonlinear Control Design Blockset	Stateflow Coder
Real-Time Workshop	Virtual Reality Toolbox
Real-Time Workshop Embedded Coder	

Contents of UNIX CD 3	
Control System Toolbox	MATLAB Web Server
Curve Fitting Toolbox	Model Predictive Control Toolbox
Database Toolbox	Mu-Analysis and Synthesis Toolbox
Extended Symbolic Math Toolbox	Neural Network Toolbox
Filter Design Toolbox	Optimization Toolbox
Financial Toolbox	Partial Differential Equation Toolbox
Financial Derivatives Toolbox	Requirements Management Interface
Financial Time Series Toolbox	Robust Control Toolbox
Fuzzy Logic Toolbox	Signal Processing Toolbox
GARCH Toolbox	Simulink Report Generator
Image Processing Toolbox	Spline Toolbox
Instrument Control Toolbox	Statistics Toolbox
LMI Control Toolbox	Symbolic Math Toolbox
Mapping Toolbox	System Identification Toolbox
MATLAB Compiler	Wavelet Toolbox
MATLAB Report Generator	

Quick Access to Product-Specific Release Notes

Below are links to the product-specific Release Notes for each MathWorks product. If a product is not listed below, it has not changed significantly since Release 11.

Note Products with an asterisk (*) do not include significant changes for Release 13. Refer to Release Notes for those products only if you are upgrading from a release *prior to* Release 12.1.

MATLAB

MATLAB 6.5	MATLAB Link for Code Composer Studio™ Development Tools 1.0
MATLAB COM Builder 1.0	MATLAB Report Generator 1.3
MATLAB Compiler 3.0	MATLAB Web Server 1.2.2
MATLAB Excel Builder 1.1	

Toolboxes

Communications Toolbox 2.1	Instrument Control Toolbox 1.2
Control System Toolbox 5.2	Mapping Toolbox 1.3
Curve Fitting Toolbox 1.1	Model-Based Calibration Toolbox 1.1
Database Toolbox 2.2.1*	Neural Network Toolbox 4.1*
Data Acquisition Toolbox 2.2	Optimization Toolbox 2.2
Datafeed Toolbox 1.3.1	Signal Processing Toolbox 6.0

Toolboxes (Continued)

Filter Design Toolbox 2.2	Spline Toolbox 3.1.1
Financial Derivatives Toolbox 2.0	Statistics Toolbox 4.0
Financial Time Series Toolbox 2.0	Symbolic Math Toolbox 2.1.3*
Financial Toolbox 2.2.1*	System Identification Toolbox 5.0.2*
Fuzzy Logic Toolbox 2.1.2*	Virtual Reality Toolbox 3.0
Image Processing Toolbox 3.2	Wavelet Toolbox 2.2

Simulink

Simulink 5.0	SimMechanics 1.1
Embedded Target for Motorola MPC555 1.0.1	SimPowerSystems 2.3
Real-Time Windows Target 2.2	Simulink Report Generator 1.3
Real-Time Workshop 5.0	Stateflow 5.0 and Stateflow Coder 5.0
Real-Time Workshop Embedded Coder 3.0	xPC Target 2.0
Requirements Management Interface 1.0.4	

Blocksets

Aerospace Blockset 1.0	Embedded Target for the TI TMS320C6000™ DSP Platform 1.0
CDMA Reference Blockset 1.1*	DSP Blockset 5.0
Communications Blockset 2.5	Fixed-Point Blockset 4.0
Dials & Gauges Blockset 1.1.2	