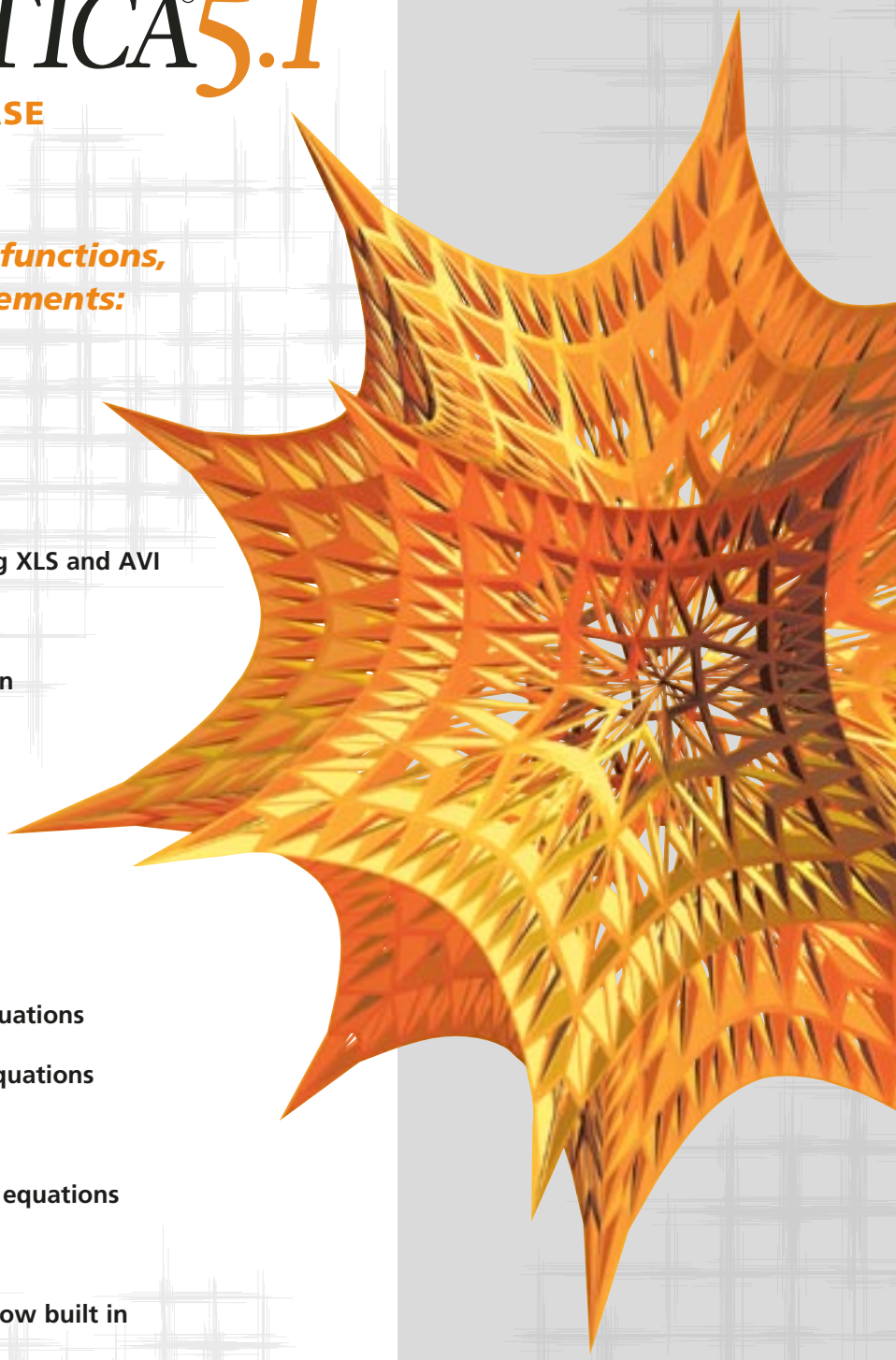
Speed. Scope. Scalability.

MATHEMATICA® 5.1

THE DATA FUNCTIONS RELEASE



Introducing hundreds of new functions, extensions, and other enhancements:

- Industrial-strength string manipulation
- Built-in universal database connectivity
- Highly optimized binary data I/O
- Additional import-export formats, including XLS and AVI
- Integrated web services support
- 2D and 3D automated network visualization
- High-performance array visualization
- Numerical linear algebra performance enhancements
- Fully integrated piecewise functions
- Integration over implicitly defined regions
- Event handling in numerical differential equations
- New algorithms for symbolic differential equations
- Cluster analysis capabilities added
- Interactive exploration tool for differential equations
- *MathematicaMark*™ benchmarking tool
- *GUIKit* interface and application builder—now built in
- and many more innovations

FEATURES NEW IN MATHEMATICA 5.1

NUMERICAL COMPUTATION

New highly enhanced algorithms for high-precision LinearSolve.

Internal vectorization of high-precision vector operations.

New high-performance methods for MatrixExp.

Support for sparse singular value decomposition.

Support for HessenbergDecomposition.

Typeset notation for Transpose and Conjugate.

Numerical integration of discontinuous piecewise functions.

Numerical integration over implicitly defined regions.

Support for event detection in NDSolve.

Additional convenience functions Boole, Clip, and Rescale.

Package for cluster analysis and dendrograms.

Package for interactive exploration of differential equation systems.

SYMBOLIC COMPUTATION

General vector derivatives, including gradient, Hessian, and Jacobian.

Piecewise construct for representing general piecewise functions.

Simplification with piecewise and nested piecewise functions.

Reduction of piecewise equations and inequalities, including quantifiers.

Limit, Series, and D support for general piecewise functions.

Indefinite and definite integration of general piecewise functions.

Support for solving piecewise ordinary differential equations.

Symbolic multiple integration over regions defined by inequalities.

Enhanced support for solving Abel and other differential equations.

Support for linear differential equations with nonrational coefficients.

Nonlinear partial differential equation solutions based on complete integrals.

Support for equations with multiple moduli in Reduce.

Additional methods for solving Diophantine equations.

LANGUAGE AND CORE SYSTEM

Full support for optimized string pattern matching.

Integrated string and expression pattern language.

General support for complement patterns with Except.

String patterns integrated into all string operations.

Generalized StringCases for string analysis.

New functions StringSplit, StringCount, and StringReplaceList.

RegularExpression construct for compact string pattern notation.

English-language dictionary package.

Support for generalized Tuples and Subsets.

Expression filtering function Pick.

Package for benchmarking of computer systems.

DATA HANDLING AND VISUALIZATION

ArrayPlot for flexible large-scale array visualization.

Package for fully automated network and tree layout in 2D and 3D.

Highly optimized import and export of binary data.

Import and export of XLS spreadsheet files.

Support for HDF5, MAT (v5), DIF, and PCX.

Export of AVI movie files.

Import from http and ftp URLs.

Automated encoding and decoding of .gz files.

Integrated TEX import and parsing in notebooks.

Symbolic names for common colors such as Red and Black.

DATABASE ACCESS

DatabaseLink for universal cross-platform database connectivity.

Bundled drivers for most common database systems.

Integrated language interface for database discovery, query, and updating.

Graphical interface for database connection and exploration.

Bundled SQL engine for creating custom databases.

GUI TOOLS

Integrated *GUIKit* for building standalone user interfaces.

Platform-independent *Mathematica* language GUI specification.

Over 100 types of controls and widgets.

Automatic layout for complex dialog boxes.

System for creating sequential wizard interfaces.

Large library of sample GUI applications.

WEB SERVICES

Transparent access to web services from within *Mathematica*.

Support for SOAP and WSDL.

Packages for search and lookup on Wolfram Research and other sites.

For examples of some of these new features, see **www.wolfram.com/mathematica/newin51**.

MATHEMATICA 5.1 IS AVAILABLE FOR:
Windows, Mac OS X, Linux x86/x86-64bit/Itanium, Solaris, HP Tru64 Unix, HP-UX, IBM AIX, IRIX

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