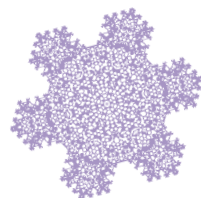


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## other developments

### Independent Application Packages

#### **MathOptimizer Professional**

*MathOptimizer Professional* offers advanced strategies for solving continuous global and convex optimization problems in the *Mathematica* environment. It combines the power of *Mathematica* with the established Lipschitz Global Optimizer (LGO) solver suite to provide sophisticated application development tools and solver functionality.

*MathOptimizer Professional* is an extremely versatile package with applications across many fields. Using LGO, it can handle complex, large-scale models involving thousands of variables and constraints. However, the user does not have to work directly with the compiler or LGO, except for issuing a calling statement from *Mathematica*.

For more information:

[www.wolfram.com/products/applications/mathoptpro](http://www.wolfram.com/products/applications/mathoptpro)

#### **Advanced Modern Control**

*Advanced Modern Control* supplements the *Control System Professional* application package suite, providing methods for modern controller design, model reduction, and system evaluation. All operations are carried out in a step-by-step, no-guesswork environment that employs robust computational procedures and informative graphical output.

*Advanced Modern Control* is for anyone who needs to design controllers satisfying norm-based specifications and to analyze the resulting closed-loop performance in order to determine how well the design meets those specifications.

For more information:

[www.wolfram.com/products/applications/amc](http://www.wolfram.com/products/applications/amc)

### Upcoming Events

#### January 7–10, 2004

Look for Wolfram Research at Joint Mathematics Meetings 2004 in Phoenix, Arizona, where Stephen Wolfram will deliver a keynote address.

[www.ams.org/amsmtgs/2078\\_progfull.html](http://www.ams.org/amsmtgs/2078_progfull.html)

#### April 23–25, 2004

See *A New Kind of Science* develop by attending the NKS 2004 Conference in Boston, Massachusetts.

[www.wolframscience.com/conference/2004](http://www.wolframscience.com/conference/2004)

#### October 21–23, 2004

Mark your calendars for the Wolfram Technology Conference to be held in Champaign, Illinois.

[www.wolfram.com/news/events/techconf2004](http://www.wolfram.com/news/events/techconf2004)



#### The Wolfram Education Group

Wolfram Education offers *Mathematica*

training courses for all levels of users, with new online classes starting in early 2004. For specific dates or locations check our training calendar.

[www.wolfram.com/weg](http://www.wolfram.com/weg)

### Recent Book Releases

*The Mathematica Book*, Fifth Edition, by Stephen Wolfram  
[store.wolfram.com/view/book/ISBN1579550223.str](http://store.wolfram.com/view/book/ISBN1579550223.str)

*CalCLabs with Mathematica for Stewart's Single Variable Calculus* by Selwyn Hollis  
[store.wolfram.com/view/book/ISBN0534393713.str](http://store.wolfram.com/view/book/ISBN0534393713.str)

*Challenging the Boundaries of Symbolic Computation: Proceedings of the 5th International Mathematica Symposium* edited by Peter Mitic, Philip Ramsden, and Janet Carne  
[store.wolfram.com/view/book/ISBN1860943632.str](http://store.wolfram.com/view/book/ISBN1860943632.str)

*Computing with Mathematica* by Hartmut F. and Margret H. Höft  
[store.wolfram.com/view/book/ISBN0123516609.str](http://store.wolfram.com/view/book/ISBN0123516609.str)

*Mathematica Computer Guide* by E. Kreyszig and E. J. Norminton  
[store.wolfram.com/view/book/ISBN0471386693.str](http://store.wolfram.com/view/book/ISBN0471386693.str)

*Mathematical Methods Using Mathematica: For Students of Physics and Related Fields* by Sadri Hassani  
[store.wolfram.com/view/book/ISBN0387955232.str](http://store.wolfram.com/view/book/ISBN0387955232.str)

*Modelling Metabolism with Mathematica* by Peter J. Mulquaney and Philip W. Kuchel  
[store.wolfram.com/view/book/ISBN0849314682.str](http://store.wolfram.com/view/book/ISBN0849314682.str)

*Partial Differential Equations and Boundary Value Problems with Mathematica*, Second Edition, by Prem K. Kythe, Pratap Puri, and Michael R. Schäferkötter  
[store.wolfram.com/view/book/ISBN1584883146.str](http://store.wolfram.com/view/book/ISBN1584883146.str)

# technical software news

ISSUE THREE 2003

A PUBLICATION OF WOLFRAM RESEARCH

## "★★★★★" for Mathematica® 5

### Mathematica 5 Is Receiving Rave Reviews

Thousands of users have already begun to enjoy the advances in the new high-performance *Mathematica* 5, and reviewers are impressed as well. See what people are saying about *Mathematica* 5 and why you'll want to experience it for yourself.

*"One calculation that took us 5 minutes on Mathematica 4.2 took only 15 seconds in this new release.... And the numerical improvements are so spectacular that most current Mathematica users will want to upgrade."*

*PC Magazine*, September 2003

*"[Mathematica] is one of the supreme examples of programming.... It's simple enough for almost anyone who works with numbers.... If you already use Mathematica, you'll want to upgrade."*

*Government Computer News*, September 2003

For additional media coverage, including *Computer Shopper's* five-star review:

[www.wolfram.com/news/coverage.html](http://www.wolfram.com/news/coverage.html)

### Download To Get Up and Running Today

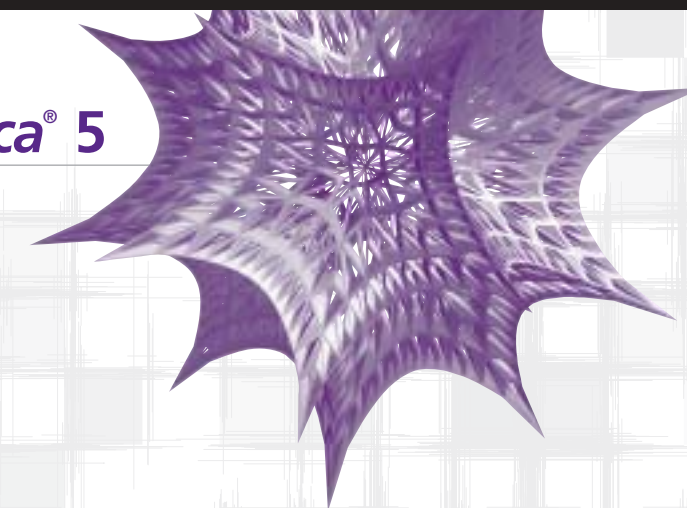
Not only has Wolfram Research significantly improved the performance of *Mathematica* with the release of Version 5, but we've also expanded the capabilities of our website and online store with new and faster, more convenient download purchase options. Now you can start using *Mathematica* and other Wolfram Research products immediately with downloads direct to your computer. *Mathematica* 5, *Mathematica for Students* 5, and a number of application packages are already being offered in this format. More products will be added as they become available.

### Free Trial Versions Let Our Products Speak for Themselves

If you're reading this, you're probably already a user of *Mathematica* technology and are aware of its many advantages. However, you may have colleagues or friends who you think could also benefit from using Wolfram Research products. We encourage you to tell them about the free trial versions of our two major products, *Mathematica* and *CalculationCenter*®, which can be downloaded from the Wolfram Research website.

For more information: [www.wolfram.com/trym5](http://www.wolfram.com/trym5)

[www.wolfram.com/trycc](http://www.wolfram.com/trycc)



### Special Upgrade Offer

Available through December 31st

As an existing user of *Mathematica* 4.0 or later, you may be eligible to receive 50 percent off the cost of upgrading to *Mathematica* 5 when you purchase *Premier Service*. It offers a number of benefits including free upgrades, home use, and technical support, as well as discounts on select *Mathematica* application packages.

To take advantage of this offer, you must contact Wolfram Research or your reseller listed at [www.wolfram.com/intdealers](http://www.wolfram.com/intdealers). Be sure to mention promotion code **PD306**.

For more information about *Premier Service*:

[www.wolfram.com/products/service](http://www.wolfram.com/products/service)

## in this issue

2 *Mathematica* for 64-bit Computing  
*Mathematica* for Intel Itanium  
*gridMathematica*™ 1.1  
Tech Tips  
User Profiles

3 *Mathematica Homeschool Kit*  
*Mathematica for Students*:  
*Semester Edition* and *Annual Edition*

4 Other Developments  
Independent Application Packages  
Upcoming Events  
Recent Book Releases

## tech tips

- *Mathematica* is now optimized for solving large-scale linear programming problems, using an efficient interior-point method. Until now, similar functionality has been available only in expensive special-purpose packages. [www.wolfram.com/mathematica/newin5/performance/largescalelinear.html](http://www.wolfram.com/mathematica/newin5/performance/largescalelinear.html)
- You can now solve Diophantine equations in *Mathematica* 5. The function **Reduce** lets you solve equations using different domain specifications, enabling it to handle equations over integers as well as real and complex variables. [www.wolfram.com/mathematica/newin5/symbolic/reduce.html](http://www.wolfram.com/mathematica/newin5/symbolic/reduce.html)
- In *Mathematica*, you can evaluate functions in place in all cells by selecting the function to evaluate, right-clicking, and choosing **Evaluate in Place**. Keyboard shortcuts for this command are **CTRL+SHIFT+ENTER** on Windows, **COMMAND+RETURN** on Mac OS X, and **COMMAND+SHIFT+RETURN** on Unix platforms. [documents.wolfram.com/v5/FrontEnd/MenuCommands/KernelMenu/Evaluation/EvaluationEvaluateInPlace.html](http://documents.wolfram.com/v5/FrontEnd/MenuCommands/KernelMenu/Evaluation/EvaluationEvaluateInPlace.html)

## gridMathematica 1.1

Grid Computing Gets a Speed Boost from *Mathematica* 5

gridMathematica now includes the new high-performance *Mathematica* 5. The update delivers large performance gains in dense numerical linear algebra, support for sparse numerical linear algebra, large-scale linear programming, and arbitrary precision computation.

Version 1.1 also capitalizes on a new TCP/IP protocol in *Mathematica* 5 that allows it to communicate at the speed of the underlying network. On most standard networks, this means that users will see bandwidth improvements of a factor of 10 and latency improvements of a factor of 200; on faster networks the gains are even higher.

For more information:  
[www.wolfram.com/gridmathematica](http://www.wolfram.com/gridmathematica)

## Mathematica for 64-bit Computing Applications

Wolfram Research's gigaNumerics initiative is keeping pace with customer demand for ever more powerful systems and technology. With the addition of new ports to the Intel Itanium 2 and AMD x86-64 platforms, there is now a native 64-bit version of *Mathematica* for all major Linux and Unix systems. In addition, an optimized version of *Mathematica* for the Mac G5 was previewed at the Apple WWDC

2003 conference and is anticipated for release by the end of the year.

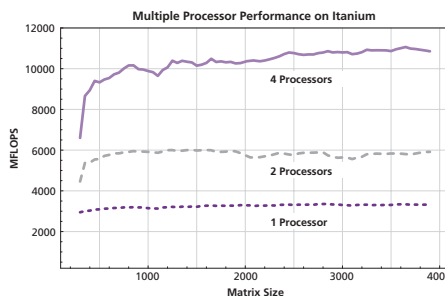
Consider switching to one of these new, high-end versions of *Mathematica* for your most intensive computational needs. All versions deliver tremendous performance in a virtually limitless computing environment. Eligible Premier Service users can contact Wolfram Research for a free update or system transfer.

## Mathematica for Intel Itanium Platform Unites High-Performance Technologies

*Mathematica* 5 is now available for Linux on the Intel Itanium processor family. This makes *Mathematica* the first technical computing system to be optimized for the Itanium 2-based platform, which Intel has cast as the future of high-end computing environments.

*Mathematica*—and Version 5 in particular, with its unparalleled speed, scope, and scalability—is an ideal fit for Intel Itanium. Its implementation of arbitrary-precision numerics makes *Mathematica* unique among technical computing systems in its ability to truly gain performance on 64-bit platforms.

A powerful complement to this new 64-bit *Mathematica* environment is gridMathematica, a parallel computing solution that is fully compatible with Itanium. gridMathematica is equally suited for clusters of Intel Itanium 2-based servers and large multiprocessor configurations such as Hewlett-Packard's Integrity servers, which currently can consist of up to 64 parallel Intel Itanium 2 CPUs. Powerhouse applications such as *Mathematica* and gridMathematica



This graph shows the number of megaflops as a function of matrix size for the dot product of two  $n \times n$  matrices on an Itanium 2 computer with four 900 MHz processors. The number of operations per second almost doubles when the number of processors used doubles.

are a strong draw for users who have intensive computing demands and need to be able to solve ever larger problems.

*Mathematica* 5 for Intel Itanium 2 is immediately downloadable upon purchase from the Wolfram Research web store.

For more information:  
[www.wolfram.com/news/itanium2.html](http://www.wolfram.com/news/itanium2.html)

## Mathematica Homeschool Kit

*Mathematica Homeschool Kit* Provides Affordable Math Software for Homeschoolers

Wolfram Research has combined several of its acclaimed products for precollege education to create *Mathematica Homeschool Kit*, a trilogy of quality software titles that make math and science education in the home a more engaging experience. Homeschoolers who meet eligibility requirements receive a generous discount on this kit, which gives children the edge they need to be successful using the same *Mathematica* technology preferred by leading schools, universities, and professionals worldwide.

*Mathematica Homeschool Kit* includes three popular Wolfram Research products: *Mathematica Teacher's Edition*, *The Mathematical Explorer*, and *Calculus WIZ*™, for use with children from grade school all the way through college.

Whether the subject is basic math, advanced calculus, or anything in between, *Mathematica Teacher's Edition* remembers everything that parents may have forgotten about precollege mathematics. This saves valuable prep time and allows for greater instructional creativity. Parents can use



*"Mathematica Teacher's Edition has the answers for you, both literally and figuratively!"*

*Homeschooling Parent, August 2003*

*Mathematica Teacher's Edition* to generate fresh assignments and quizzes (with answer keys!), show animated demos, and utilize interactive courseware—right out of the box.

Parents can introduce their children to the stories and faces behind the math with

*The Mathematical Explorer*. Students will explore some of the most fascinating topics in mathematics, from ancient Greece up to the 21st century, as they walk in the computational footsteps of history's greatest mathematicians.

As children begin to study more advanced topics, parents will welcome the aid of *Calculus WIZ* to help them master a core college requirement. *Calculus WIZ* is an interactive calculus tutorial that's simple, powerful, and easy to understand, giving students a firm grasp of key concepts.

*Mathematica Homeschool Kit* gives parents innovative and affordable tools they can use to start their children on a lifetime love of learning and appreciation for mathematics. Together, these products will give students the opportunity to explore real-world problems and develop a solid foundation that will serve them well throughout their future educational and professional careers.

For more information:  
[www.wolfram.com/homeschoolkit](http://www.wolfram.com/homeschoolkit)

## Mathematica for Students: Semester Edition and Annual Edition

New Six-Month and One-Year Licenses Cost Just Half the Price of a Textbook

Wolfram Research continues to take the lead in responding to the needs of students and faculty with the introduction of the new semester and annual editions of *Mathematica for Students*. These time-limited, downloadable editions provide an immediate and very affordable way for students anywhere in the world to gain the *Mathematica* advantage in any class.

With all of the functionality of the professional version, *Mathematica for Students* lets students finish homework assignments and lab reports in record time and is capable of performing all of the computations that students encounter in school, from elementary to postgraduate level.

These new downloadable editions will appeal to a broader range of students, including those with less technical majors, who may need the capabilities of *Mathematica* for only one or two prerequisite or elective classes. These editions are also of benefit to faculty who would like to encourage their students to use technical software for their assignments but who previously felt that the added financial burden was too large of a deterrent.

For more information:  
[www.wolfram.com/mathforstudents/licenses.html](http://www.wolfram.com/mathforstudents/licenses.html)

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## user profiles

**The Sound of the Big Bang.** Physicist and science columnist John Cramer recently used *Mathematica* to produce a 100-second simulation of the sound of the Big Bang during the first 760,000 years of the evolution of the universe. Says Cramer, "The result sounds rather like a large jet airplane flying over your house at an altitude of 100 feet in the middle of the night."

"The idea of synthesizing the Big Bang sound ran around in my head for several days. I decided that I really needed to hear what the Big Bang sounded like. So one Saturday morning (when I should have been doing something else), I sat down and wrote a 16-line *Mathematica* program that produces the sound and saves it as a .wav file. I downloaded the frequency spectrum measured by NASA's WMAP satellite site and used it as input data for the program.

"The simulation varies the sound intensity to match the cosmic microwave, which according to WMAP peaked at 376,000 years and dropped to 36% intensity in 110,000 years on each side of the peak. The sound frequencies used in the simulation must be boosted upward by a huge factor (about 10 to the 26 power) to match the response of the human ear, because the actual Big Bang frequencies were far too low to be heard by humans (even had there been any around)."

After telling a fellow writer about his recording Cramer soon found his story featured in *New Scientist*, which led to a "big bang" of attention from media outlets worldwide. Cramer wrote to Wolfram Research about his usage of *Mathematica* and was kind enough to send along his notebook, which can be found at [library.wolfram.com/infocenter/MathSource/5083](http://library.wolfram.com/infocenter/MathSource/5083)

Read more about this user:  
[www.wolfram.com/news/bigbangsound.html](http://www.wolfram.com/news/bigbangsound.html)

**Mathematica Adds Insight to Space Telescope Design.** Chuck Strickland works at a top government agency. He uses *Mathematica* to design optical systems for space telescopes. He is also blind. Becoming a physicist and working in the space program became a major goal for Strickland at age nine. He uses computers with special input and output devices designed for blind individuals, which help him communicate with *Mathematica*.

Strickland currently employs *Mathematica* in the preliminary phase of optical system design. At this early stage, simulating theoretical models is much faster and more cost effective than building physical models. With *Mathematica*, he constructs a very basic theoretical model that traces only one or two light rays through the optical system's lenses, mirrors, prisms, and diffraction gratings. Says Strickland, "*Mathematica* helps reveal the subtleties of the design."

Although Strickland's journey has not been a typical one, he believes that technology will make it possible for more people to follow in his footsteps. In his own words, "I would like my experience and success with the use of *Mathematica* to be an inspiration for other blind individuals who are considering a technical profession."

Read more about this user:  
[www.wolfram.com/news/strickland.html](http://www.wolfram.com/news/strickland.html)

### Experience Exchange

Submit your nonproprietary journal or conference articles, papers, web links, or other *Mathematica*-related success stories to [experience@wolfram.com](mailto:experience@wolfram.com). If we feature your work on our website, we'll send you a *Mathematica* T-shirt.

For more information:  
[www.wolfram.com/mathematica/experience](http://www.wolfram.com/mathematica/experience)