Электронные публикации и основные физико-математические ресурсы Интернета

А.Д. Полянин, А.И. Журов

Институт проблем механики РАН, г. Москва

XVIII сессия Международной Школы по моделям механики сплошной среды •
27.09-1.09.2007 г. Ф

Содержание

1. Об электронных публикациях, размещенных в Интернете
2. Основные физико-математические ресурсы Интернета
3. О сайте EqWorld — Мир математических уравнений
4. Об электронных библиотеках

Об электронных публикациях в Интернете

В связи со стремительным развитием сети Интернет во всем мире в последние годы четко прослеживаются следующие тенденции:

1. **Появление значительного числа электронных научных публикаций (в основном за рубежом) и электронных журналов в Интернете.**

Об электронных публикациях в Интернете

2. **Многие исследователи (в том числе и ученые с мировым именем, входящие в редколлегии известных журналов), помимо обычных публикаций в журналах параллельно "выкладывают" свои статьи в Интернете.**

Это обусловлено тремя причинами:

(а) Публикации в Интернете появляются значительно быстрее (это особенно важно, когда идет речь о приоритетных работах).

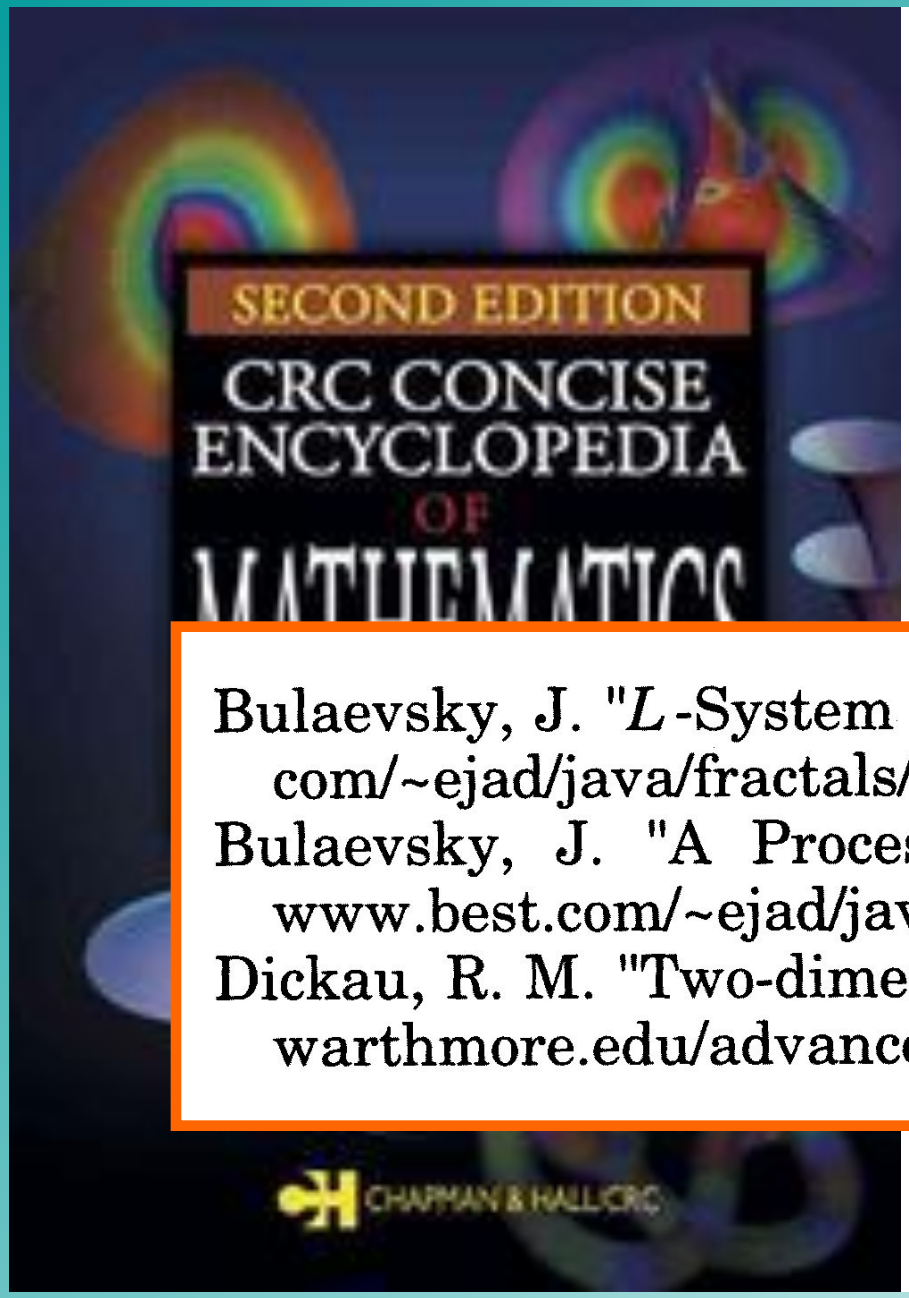
(б) Публикации в Интернете охватывают значительно более широкий круг читателей, если они размещены на известных и хорошо посещаемых сайтах.

(в) Публикации в Интернете "страхуют" ученых от недобросовестных рецензентов (бывает, что статья отклоняется, после чего похожие результаты появляются с работах других авторов).

Об электронных публикациях в Интернете

3. **На Западе часто цитируются и ссылаются на электронные публикации и сайты не только в научных журналах, но и в книгах.**

Примеры современных научных книг широкого профиля, в которых даются ссылки на электронные источники



$$\frac{1}{s_n^2}\sum_{k=1}^{n}\int_{|y|<ts_n} y^2 F_k\{dy\} \to 1. \qquad (6)$$

Then the distribution

$$S_n^* = \frac{X_1 + \ldots + X_n}{s_n} \qquad (7)$$

tends to the NORMAL DISTRIBUTION with zero expectation and unit variance (Feller 1971, p. 256). The Lindeberg condition (5) guarantees that the individual variances σ_k^2 are small compared to their sum s_n^2 in the sense that for given $\epsilon > 0$ for for all SUFFICIENTLY LARGE n, $\sigma_k/s_n < \epsilon$ for $k = 1, \ldots, n$ (Feller 1971, p. 256).

See also CENTRAL LIMIT THEOREM, FELLER-LÉVY CONDITION

References

Feller, W. "Uuml;ber den zentralen Grenzwertsatz der Wahrscheinlichkeitsrechnung." *Math. Zeit.* **40**, 521–59, 1935.
Feller, W. "Über den zentralen Grenzwertsatz der Wahrscheinlichkeitsrechnung, II." *Math. Zeit.* **42**, 301–12, 1935.
Feller, W. *An Introduction to Probability Theory and Its Applications, Vol. 2, 3rd ed.* New York: Wiley, pp. 257–58, 1971.
Feller, W. *An Introduction to Probability Theory and Its Applications, Vol. 1, 3rd ed.* New York: Wiley, p. 229, 1968.
Lindeberg, J. W. "Eine neue Herleitung des Exponentialgesetzes in der Wahrschienlichkeitsrechnung." *Math. Z.* **15**, 211–25, 1922.
Zabell, S. L. "Alan Turing and the Central Limit Theorem." *Amer. Math. Monthly* **102**, 483–94, 1995.

Lindelof's Theorem

The SURFACE OF REVOLUTION generated by the external CATENARY between a fixed point a and its conjugate on the ENVELOPE of the CATENARY through the fixed point is equal in AREA to the surface of revolution generated by its two Lindelof TANGENTS, which cross the axis of rotation at the point a and are calculable from the position of the points and CATENARY.

See also CATENARY, ENVELOPE, SURFACE OF REVOLUTION

Lindemann-Weierstrass Theorem

If $\alpha_1, \ldots, \alpha_n$ are linearly independent over $\mathbb{Q}$, then $e^{\alpha_1}, \ldots, e^{\alpha_n}$ are ALGEBRAICALLY INDEPENDENT over $\mathbb{Q}$. The Lindemann-Weierstrass theorem is implied by SCHANUEL'S CONJECTURE (Chow 1999).

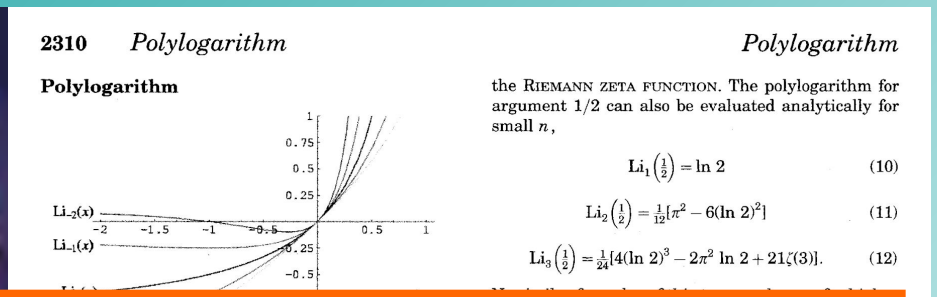
See also ALGEBRAICALLY INDEPENDENT, HERMITE-LINDEMANN THEOREM, SCHANUEL'S CONJECTURE

References

Baker, A. Theorem 2.1 in *Transcendental Number Theory.* Cambridge, England: Cambridge University Press, 1990.
Chow, T. Y. "What is a Closed-Form Number?" *Amer. Math. Monthly* **106**, 440–48, 1999.

Euclid defined a line as a "breadthless length," and a straight line as a line which "lies evenly with the points on itself" (Kline 1956, Dunham 1990). Lines are intrinsically 1-dimensional objects, but may be embedded in higher dimensional SPACES. An infinite line passing through points A and B is denoted $\overleftrightarrow{AB}$. A

Bulaevsky, J. "*L*-System Based Fractals." http://www.best.com/~ejad/java/fractals/lsystems.shtml.
Bulaevsky, J. "A Process to Generate Fractals." http://www.best.com/~ejad/java/fractals/process.shtml.
Dickau, R. M. "Two-dimensional L-systems." http://forum.swarthmore.edu/advanced/robertd/lsys2d.html.



2310 *Polylogarithm* *Polylogarithm*

Polylogarithm

the RIEMANN ZETA FUNCTION. The polylogarithm for argument 1/2 can also be evaluated analytically for small n,

$$\mathrm{Li}_1\left(\tfrac{1}{2}\right) = \ln 2 \tag{10}$$

$$\mathrm{Li}_2\left(\tfrac{1}{2}\right) = \tfrac{1}{12}[\pi^2 - 6(\ln 2)^2] \tag{11}$$

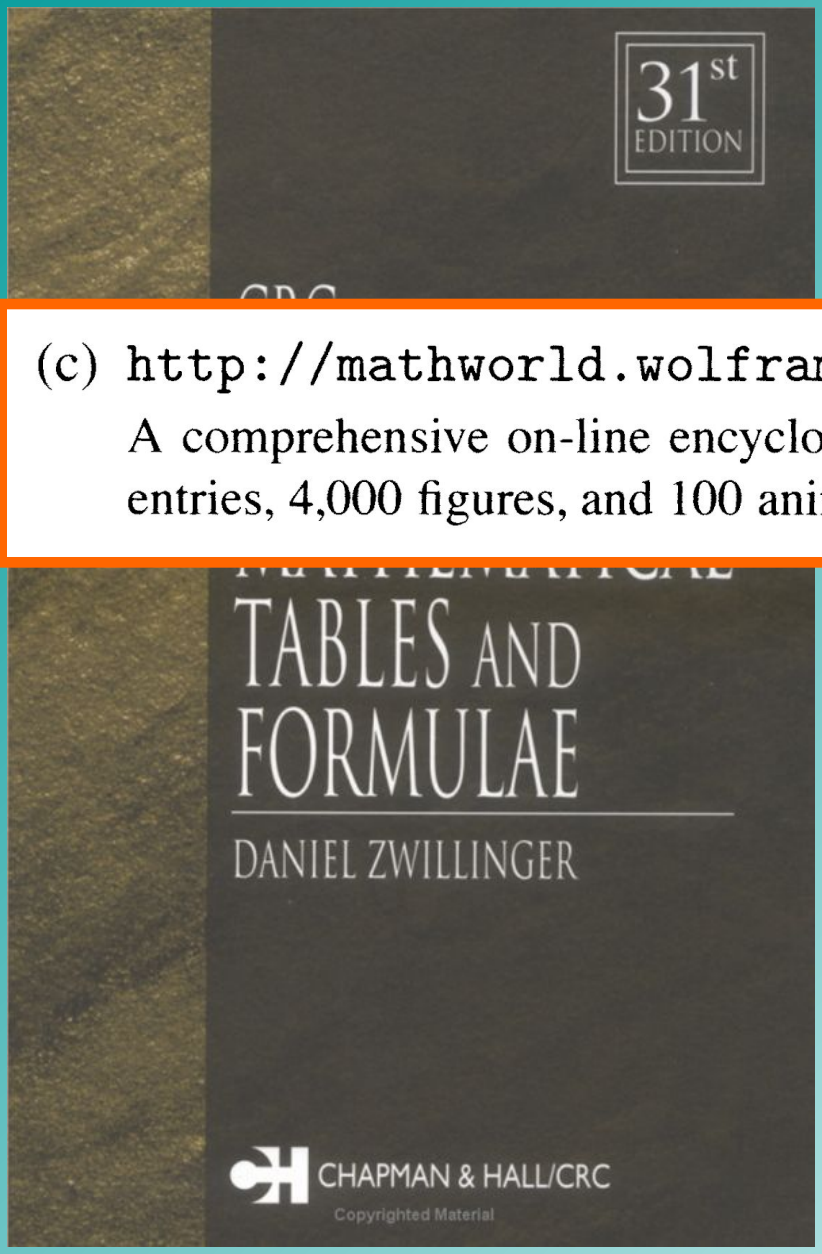
$$\mathrm{Li}_3\left(\tfrac{1}{2}\right) = \tfrac{1}{24}[4(\ln 2)^3 - 2\pi^2 \ln 2 + 21\zeta(3)]. \tag{12}$$

Bailey, D.; Borwein, P.; and Plouffe, S. "On the Rapid Computation of Various Polylogarithmic Constants." http://www.cecm.sfu.ca/~pborwein/PAPERS/P123.ps.

Bailey, D. H. and Broadhurst, D. J. A Seventeenth-Order Polylogarithm Ladder. 20 Jun 1999. http://xxx.lanl.gov/abs/math.CA/9906134/.

Borwein, J. M.; Bradley, D. M.; Broadhurst, D. J.; and Losinek, P. "Special Values of Multidimensional Polylogarithms." CECM-98:106, 14 May 1998. http://www.cecm.sfu.ca/preprints/1998pp.html#98:106.

Borwein, J. M.; Bradley, D. M.; Broadhurst, D. J.; and Losinek, P. Special Values of Multidimensional Polylogarithms. 8 Oct 1999. http://xxx.lanl.gov/abs/math.CA/9910045/.



10.9 ELECTRONIC MATHEMATICAL RESOURCES

1. General web sites related to mathematics

   (a) `http://dir.yahoo.com/Science/mathematics/`
   A very large list of useful sites relating to mathematics. It is perhaps the best place to start researching an arbitrary mathematical question not covered elsewhere in this list.

   (c) `http://mathworld.wolfram.com`
   A comprehensive on-line encyclopedia of mathematics with more than 10,000 entries, 4,000 figures, and 100 animated graphics.

   (f) `http://thesaurus.maths.org`
   A *mathematical thesaurus.*

   (g) `http://www.cs.unb.ca/~alopez-o/math-faq/math-faq.html`
   The *FAQ* (frequently asked questions) listing from the news group `sci.math`.

2. Web sites that respond to user input

   (a) `http://www-neos.mcs.anl.gov/`
   The *NEOS server for optimization* will run many different optimization packages on an input user problem.

   (b) `http://www.theory.csc.UVic.CA/~cos/`
   The *Combinatorial Object Server* creates combinatorial objects such as necklaces, permutations, combinations, etc.

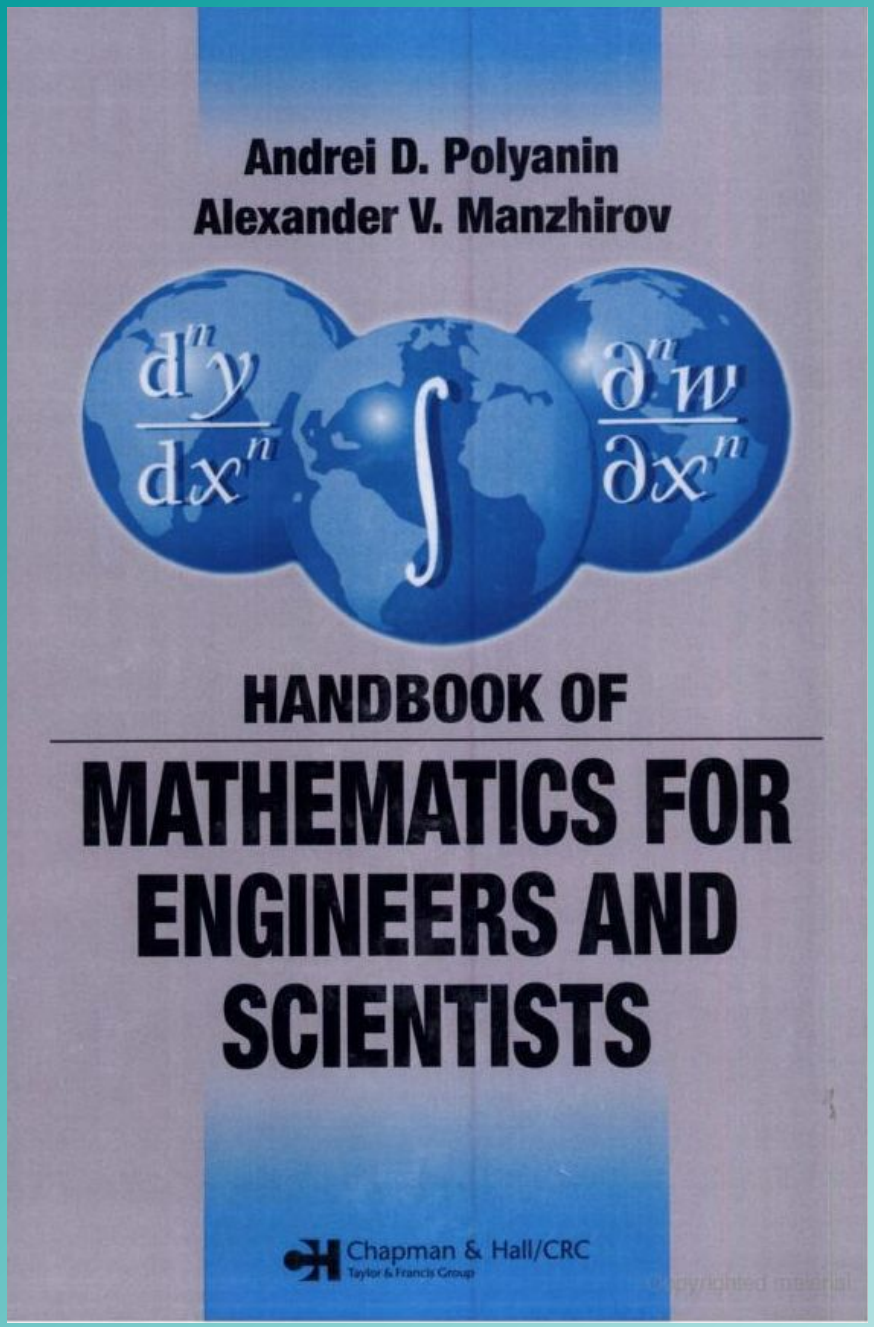
   (c) `http://www.research.att.com/~njas/sequences/`
   The *On-Line Encyclopedia of Integer Sequences* allows the "next term" in a sequence to be determined. (See page 25.)

   (d) `http://www.cecm.sfu.ca/projects/ISC/`
   If a real number is input to the *Inverse Symbolic Calculator* it will determine where this number might have come from.

3. Societies

   (a) `http://www.ams.org`
   The American Mathematical Society with the Combined Membership List of the AMS and the Math Reviews subject classifications.

   (b) `http://www.maa.org/`
   The Mathematics Association of America.


Andrei D. Polyanin
Alexander V. Manzhirov
HANDBOOK OF
MATHEMATICS FOR ENGINEERS AND SCIENTISTS
Chapman & Hall/CRC
Taylor & Francis Group

Mathematics
HANDBOOK OF
MATHEMATICS FOR ENGINEERS AND SCIENTISTS
The Handbook of Mathematics for Engineers and Scientists covers the main fields of mathematics and focuses on the methods used for obtaining solutions of various classes of mathematical equations that underlie the mathematical modeling of numerous phenomena and processes in science and technology. To accommodate different mathematical backgrounds, the preeminent authors outline the material in a simplified, schematic manner, avoiding special terminology wherever possible.
Organized in ascending order of complexity, the material is divided into two parts. The first part is a concise, coherent survey of the most important definitions, formulas, equations, methods, and theorems. It covers arithmetic, elementary and analytic geometry, algebra, differential and integral calculus, special functions, calculus of variations, probability theory, and much more. Numerous specific examples clarify the methods for solving problems and equations. The second part provides many in-depth mathematical tables, including those of exact solutions of various types of equations.
Providing the foundation for exploring scientific and technological phenomena, this concise, comprehensive compendium...
• Describes formulas, methods, equations, and solutions that are frequently used in scientific and engineering applications
• Covers classical as well as newer solution methods for various mathematical equations, such as algebraic, ordinary differential, partial differential, integral, difference, and functional
• Contains many results in tabular form, including finite sums and series, indefinite and definite integrals, direct and inverse integral transforms, and exact solutions of differential, integral, and functional equations
• Supplies numerous examples, graphs, figures, and diagrams to help with the understanding of the problems and methods discussed
• Includes an extensive table of contents, special font highlighting, cross references, and a detailed index to help locate the desired information
C5025
ISBN 1-58488-502-5
90000
9 781584 885023
Chapman & Hall/CRC
Taylor & Francis Group
www.taylorandfrancisgroup.com
6000 Broken Sound Parkway, NW Suite 300, Boca Raton, FL 33487
270 Madison Avenue New York, NY 10016
2 Park Square, Milton Park Abingdon, Oxon OX14 4RN, UK
www.crcpress.com

References for Chapter T12

Aczél, J., *Functional Equations: History, Applications and Theory*, Kluwer Academic, Dordrecht, 2002.

Aczél, J., *Lectures on Functional Equations and Their Applications*, Dover Publications, New York, 2006.

Aczél, J., Some general methods in the theory of functional equations with a single variable. New applications of functional equations [in Russian], *Uspekhi Mat. Nauk*, Vol. 11, No. 3 (69), pp. 3–68, 1956.

Aczél, J. and Dhombres, J., *Functional Equations in Several Variables*, Cambridge University Press, Cambridge, 1989.

Agarwal, R. P., *Difference Equations and Inequalities, 2nd Edition*, Marcel Dekker, New York, 2000.

Belitskii, G. R. and Tkachenko, V., *One-Dimensional Functional Equations*, Birkhäuser Verlag, Boston, 2003.

Castillo, E. and Ruiz-Cobo, R., *Functional Equations in Science and Engineering*, Marcel Dekker, New York,

Supplement

Some Useful Electronic Mathematical Resources

arXiv.org (http://arxiv.org). A service of automated e-print archives of articles in the fields of mathematics, nonlinear science, computer science, and physics.

Kuczma, M., *An Introduction to the Theory of Functional Equations and Inequalities*, Polish Scientific Publishers, Warsaw, 1985.

Kuczma, M., *Functional Equations in a Single Variable*, Polish Scientific Publishers, Warsaw, 1968.

Kuczma, M., Choczewski, B., and Ger, R., *Iterative Functional Equations*, Cambridge University Press, Cambridge, 1990.

Mathematical Encyclopedia, Vol. 2 [in Russian], Sovetskaya Entsikolpediya, Moscow, 1979, pp. 1029, 1030.

Mathematical Encyclopedia, Vol. 5 [in Russian], Sovetskaya Entsikolpediya, Moscow, 1985, pp. 699, 700, 703, 704.

Mirolyubov, A. A. and Soldatov, M. A., *Linear Homogeneous Difference Equations* [in Russian], Nauka Publishers, Moscow, 1981.

Mirolyubov, A. A. and Soldatov, M. A., *Linear Nonhomogeneous Difference Equations* [in Russian], Nauka Publishers, Moscow, 1986.

Polyanin, A. D., *Functional Equations*, From Website *EqWorld—The World of Mathematical Equations*, http://eqworld.ipmnet.ru/en/solutions/fe.htm.

Polyanin, A. D. and Zaitsev, V. F., *Handbook of Nonlinear Partial Differential Equations (Supplements S.4.4 and S.5.5)*, Chapman & Hall/CRC Press, Boca Raton, 2004.

CFD Codes List (http://www.fges.demon.co.uk/cfd/CFD_codes_p.html). Free software.

CFD Resources Online (http://www.cfd-online.com/Links). Software, modeling and numerics, etc.

Computer Handbook of ODEs (http://www.scg.uwaterloo.ca/ ecterrab/handbook_odes.html). An online computer handbook of methods for solving ordinary differential equations.

Deal.II (http://www.dealii.org). Finite element differential equations analysis library.

Dictionary of Algorithms and Data Structures—NIST (http://www.nist.gov/dads/). The dictionary of algorithms, algorithmic techniques, data structures, archetypical problems, and related definitions.

DOE ACTS Collection (http://acts.nersc.gov). The Advanced CompuTational Software (ACTS)

on algebraic, ordinary differential, partial differential, integral, functional, and other mathematical equations.

FOLDOC—Computing Dictionary (http://foldoc.doc.ic.ac.uk/foldoc/index.html). The free online dictionary of computing is a searchable dictionary of terms from computing and related fields.

Free Software (http://www.wseas.com/software). Download free software packages for scientific-engineering purposes.

FSF/UNESCO Free Software Directory (http://directory.fsf.org).

GAMS: Guide to Available Mathematical Software (http://gams.nist.gov). A cross-index and virtual repository of mathematical and statistical software components of use in computational science and engineering.

Google—Mathematics Websites (http://directory.google.com/Top/Science/Math/). A directory of more than 11,000 mathematics Websites ordered by type and mathematical subject.

Google—Software (http://directory.google.com/Top/Science/Math/Software). A directory of software.

Mathcom—PDEs (http://www.mathcom.com/corpdir/techinfo.mdir/scifaq/q260.html). Partial differential equations and finite element modeling.

Mathematical Atlas (http://www.math-atlas.org). A collection of short articles designed to provide an introduction to the areas of modern mathematics.

Об электронных публикациях в Интернете

4. **Многие англоязычные журналы сейчас имеют две версии: бумажную и электронную (иногда электронная версия выставляется в Интернете существенно раньше, чем появляется бумажная). Эти версии обычно имеют разную подписку.**

Пример российского журнала: ТОХТ (в переводе)

Пример иностранного журнала: Applied Mathematical Modelling (статья принята в октябре 2006 г., выставлена в Интернете в январе 2007 г., выйдет в ноябре 2007 г.)"

Об электронных публикациях в Интернете

5. **Многие учебные курсы (за рубежом и в России) частично или полностью переводятся в Интернет-форму.**

Это обусловлено большей доступностью и наглядностью (могут использоваться цветовые выделения, анимация и др.) материалов, размещенных в Интернете, а также возможностью диалога с обучающей программой

Об электронных публикациях в Интернете

6. **Григорий Перельман, который отказался от Филдсовской премии 2006, номинировался на премию за две электронные статьи в arXiv.org (автоматический электронный архив статей по математике и физике), которые не были опубликованы в "бумажных журналах".**

⇒ Стирается разница между бумажными и электронными публикациями

Об электронных публикациях в Интернете

7. **По утверждению ряда экспертов, в ближайшие 10-20 лет десятилетие многие журналы полностью "перейдут" из бумажной формы в "электронную". В бумажной форме сохранятся только известные журналы, имеющие большую подписку.**

Следствие: надо максимально поддерживать уже существующие российские научные журналы

Об электронных публикациях в Интернете

8. **Основные достоинства электронных публикаций:**
   - **максимально быстро становятся доступными для читателей,**
   - **нет ограничений по объему текста,**
   - **низкая стоимость (на порядок дешевле бумажных публикаций),**
   - **наглядность (можно использовать цветовые выделения, анимации, "живые" ссылки на источники внутри статьи и внешние источники, размещенные в Интернете, и др.),**
   - **максимально широкий охват потенциальных читателей,**
   - **привычная форма подачи материала для молодежи и части среднего поколения**

Международный научно-образовательный сайт EqWorld – Мир математических уравнений

Основные функции:

- Справочная информация по точным решениям математических уравнений
- Методы решения уравнений
- Учебно-образовательные материалы
- Математический форум
- Физико-математическая библиотека
- Архив уравнений и решений
- Справочная информация по математическим ресурсам Интернета

Адрес сайта: **http://eqworld.ipmnet.ru**

Cornell University Library

Search Library Search Cornell

arXiv.org

Search or Article-id (Help | Advanced search)

All papers Go!

Open access to 435,384 e-prints in Physics, Mathematics, Computer Science, Quantitative Biology and Statistics

Subject search and browse: Physics Search Form Interface Catchup

18 Jul 2007: Recent updates: PDFLaTeX, new identifiers, abs redesign, stat archive, math.IT.
See cumulative "What's New" pages.
Robots Beware: indiscriminate automated downloads from this site are *not* permitted.

Physics

- Astrophysics (**astro-ph** new, recent, find)
- Condensed Matter (**cond-mat** new, recent, find)
  includes: Disordered Systems and Neural Networks; Materials Science; Mesoscopic Systems and Quantum Hall Effect; Other; Soft Condensed Matter; Statistical Mechanics; Strongly Correlated Electrons; Superconductivity
- General Relativity and Quantum Cosmology (**gr-qc** new, recent, find)
- High Energy Physics - Experiment (**hep-ex** new, recent, find)
- High Energy Physics - Lattice (**hep-lat** new, recent, find)
- High Energy Physics - Phenomenology (**hep-ph** new, recent, find)
- High Energy Physics - Theory (**hep-th** new, recent, find)
- Mathematical Physics (**math-ph** new, recent, find)
- Nuclear Experiment (**nucl-ex** new, recent, find)
- Nuclear Theory (**nucl-th** new, recent, find)
- Physics (**physics** new, recent, find)
  includes (see detailed description): Accelerator Physics; Atmospheric and Oceanic Physics; Atomic Physics; Atomic and Molecular Clusters; Biological Physics; Chemical Physics; Classical Physics; Computational Physics; Data Analysis, Statistics and Probability; Fluid Dynamics; General Physics; Geophysics; History of Physics; Instrumentation and Detectors; Medical Physics; Optics; Physics Education; Physics and Society; Plasma Physics; Popular Physics; Space Physics
- Quantum Physics (**quant-ph** new, recent, find)

Mathematics

- Mathematics (**math** new, recent, find)
  includes (see detailed description): Algebraic Geometry; Algebraic Topology; Analysis of PDEs; Category Theory; Classical Analysis and ODEs; Combinatorics; Commutative Algebra; Complex Variables; Differential Geometry; Dynamical Systems; Functional Analysis; General Mathematics; General Topology; Geometric Topology; Group Theory; History and Overview; Information Theory; K-Theory and Homology; Logic; Mathematical

Welcome to Wikipedia,

the free encyclopedia that anyone can edit.

1,977,096 articles in English

- Arts
- Biography
- Geography
- History
- Mathematics
- Science
- Society
- Technology
- **All portals**

Today's featured article

York City F.C. is an English football club based in York, North Yorkshire. The club participates in the Conference National, the fifth tier of English football. Founded in 1922, they joined The Football League in 1929, and have spent the majority of their history in the lower divisions. The club once rose as high as the second tier of English football, spending two seasons in the Second Division in the 1970s. In the 2003–04 season the club lost their League status when they were relegated from the Third Division, and have since remained in the Conference. York have enjoyed more success in cup competitions than in the league, with highlights including an FA Cup semi-final appearance in 1955. In the 1995–96 Coca-Cola Cup, York beat Manchester United 3–0 at Old Trafford; Manchester United went on to win the FA Cup and Premiership double that season. York play their home games at KitKat Crescent in York. This stadium was formerly known as Bootham Crescent, but was renamed KitKat Crescent because of a sponsorship deal with Nestlé, whose confectionery factory, formerly known as Rowntrees, is one of the city's largest employers. (**more...**)

Recently featured: William Goebel – Sheerness – Jake Gyllenhaal

Archive – **By email** – **More featured articles...**

Did you know...

From Wikipedia's newest articles:

- ...that Singaporean dancer, choreographer and teacher **Neila Sathyalingam**, who dances in the classical Indian style *(example pictured)*, decided to devote her life to dance after performing for Queen Elizabeth II on Sri Lanka's independence?
- ...that prior to the development of binoculars, **bird collections**, collections consisting of birds and parts of their anatomy, were the dominant method of bird observation and study among ornithologists?
- ...that a picture of **Mary Ann Bevan**, "the ugliest woman in the world"

In the news

- **Ongoing floods** *(washed-out bridge pictured)* in the United States affect six states and claim at least 26 lives.
- Greece declares a state of emergency as **forest fires** kill more than 50 people.
- The Space Shuttle Orbiter *Endeavour* safely returns from a **mission** to expand the International Space Station.
- Tropical cyclones: **Hurricane Dean** passes south of Jamaica and makes landfall on the Yucatán Peninsula, while **Typhoon Sepat** moves across Taiwan and makes a second landfall in Fujian, forcing the evacuation of nearly one million people in southeastern China.
- The heaviest rainfall in 40 years causes **massive flooding** in North Korea that kills 200 and destroys 11% of the country's rice and corn fields.
- An 8.0-magnitude **earthquake** off the Pacific coast devastates Ica and various regions of Peru, killing more than 500 and flattening more than 85,000 buildings.

Wikinews – **Recent deaths** – **More current events...**

On this day...

August 26: **Heroes' Day** in the Philippines and **Ghost Festival** in the Chinese calendar (2007).

- 1071 – Byzantine-Seljuk wars: Seljuk Turks led by Alp Arslan captured Byzantine Emperor Romanos IV at the **Battle of Manzikert** *(pictured)*.
- 1346 – Hundred Years' War: English forces

Wolfram MathWorld

the web's most extensive mathematics resource

- Algebra
- Applied Mathematics
- Calculus and Analysis
- Discrete Mathematics
- Foundations of Mathematics
- Geometry
- History and Terminology
- Number Theory
- Probability and Statistics
- Recreational Mathematics
- Topology

- Alphabetical Index
- Interactive Entries
- Random Entry
- New in *MathWorld*

MathWorld Classroom

- About *MathWorld*
- Send a Message to the Team

- Order book from Amazon
- Order book from CRC Press

Last updated:
12,704 entries
Sun Aug 26 2007

A free resource from Wolfram Research built with Mathematica technology

Created, developed, & nurtured by Eric Weisstein with contributions from the world's mathematical community

The Wolfram 2,3 Turing Machine Research Prize >>

The *Math(ematica)* behind Television's Crime Drama *NUMB3RS* >>

***Mathematica* 6 and The Wolfram Demonstrations Project Launched >>**

Search Site

Go

Other Wolfram Sites:

- Wolfram Research
- Demonstrations Project
- Integrator
- Tones
- Functions Site
- Wolfram Science
- more...

Latest *Mathematica* Information >>

Complete *Mathematica* Documentation >>

Introducing a computing revolution...
MATHEMATICA REINVENTED

New! Interactive mathematics
Wolfram Demonstrations Project