


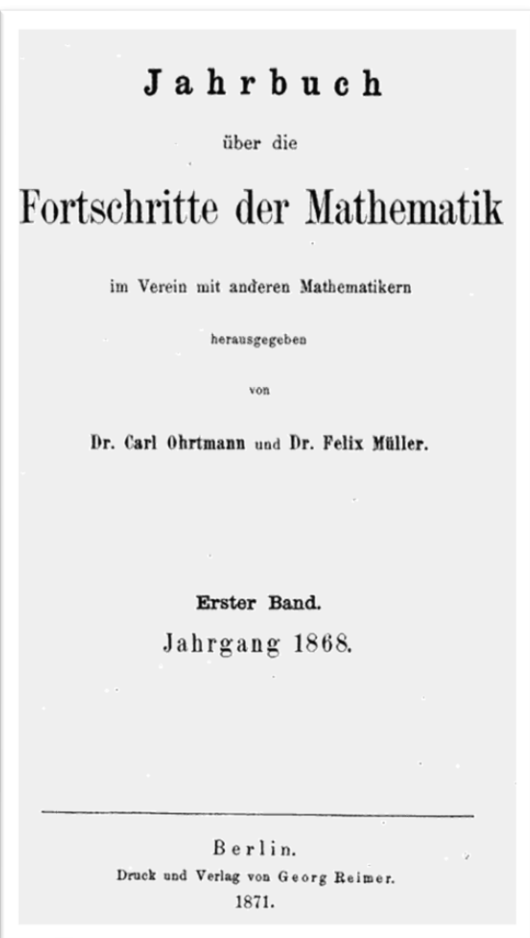
**ADVANCING SCIENCE**



# 30 years of zbMATH on the web, with a view towards Grenoble-Berlin cooperations

Olaf Teschke, MathDoc30, Oct 15h, 2025

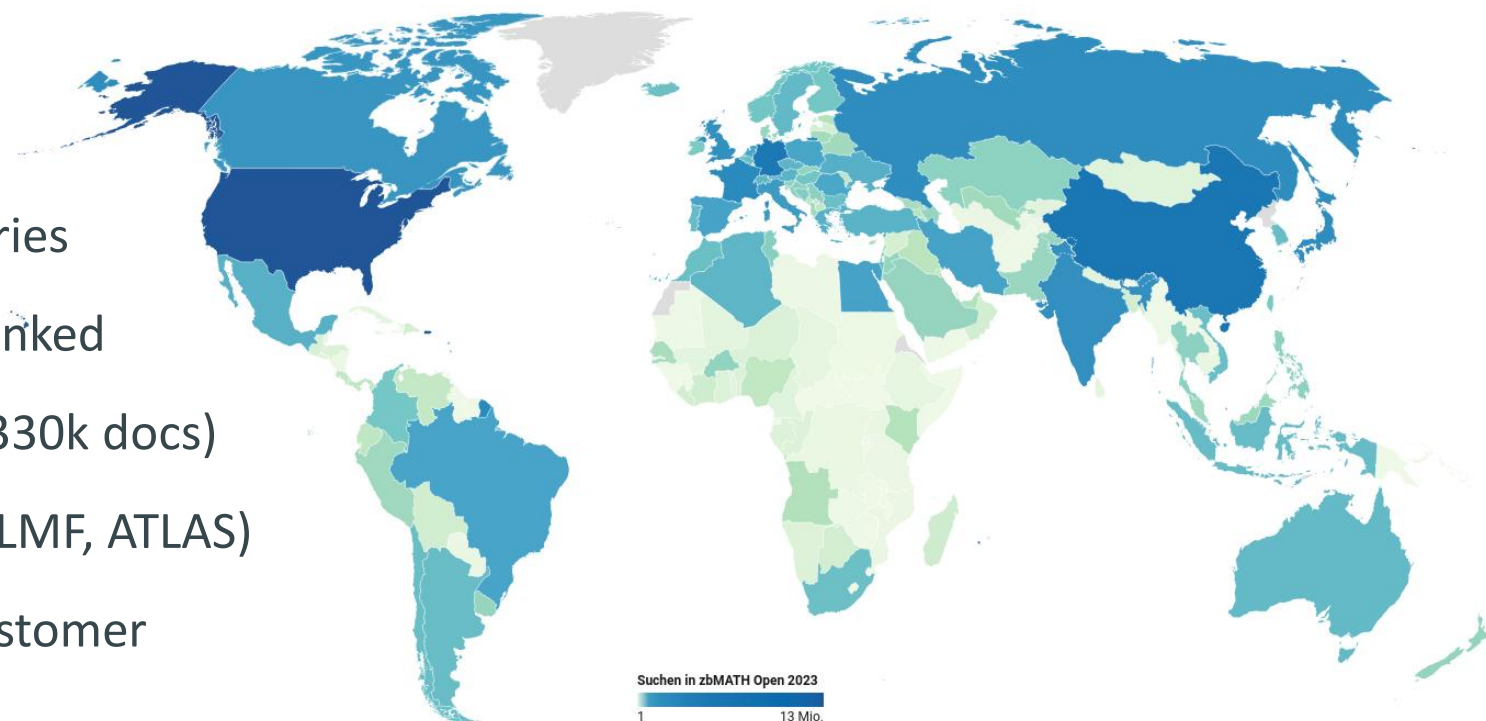
# Some Zentralblatt history before the MathDoc collaboration



- 1868 founded as Jahrbuch über die Fortschritte der Mathematik – an annual volume comprising reviews of all relevant mathematical publications of the year
- 1932 Zentralblatt für Mathematik und ihre Grenzgebiete founded by Springer – similar, but more international, more up-to-date (reviews published on a regular basis, not restricted to annual volumes)
- First Editor-in-Chief was Otto Neugebauer, working from 1934 in Copenhagen Exile
- 1938 Neugebauer resigns as EiC due to Nazi pressure on Jewish reviewers, and founds Mathematical Reviews in 1940, based on the Zentralblatt principles
- 1947 Refounding of Zentralblatt at Berlin Academy, Editorial office in East Berlin (after 1961 additional office in West Berlin), supported by Heidelberg Academy
- 1977 East Germany stops cooperation; FIZ Karlsruhe (newly founded in 1979) becomes a principal stakeholder

# zbMATH Open – status 2025

- > 5 M documents (~ 4.4M MSC classified)
- > 1.2M reviews (~ 7,300 active reviewers)
- ~ 1.4M authors, ~ 8k journals and book series
- ~ 55M references, ~ 1.6 M open fulltexts linked
- ~ 43k software packages (referenced in ~ 330k docs)
- ~ 70k references to research data (OEIS, DLMF, ATLAS)
- ~100M human searches/year [vs. 22 M customer searches in 2020],
- > 125k unique visitors/month (including institution proxies) [vs. 1,200 subscriptions in 2020]



# Going online in 1996<sup>1</sup>

<sup>1</sup>Actually, Zentralblatt had been electronically available via the STN network service 10 years, but most mathematicians won't notice

- Following the foundation of Cellule MathDoc, quickly a collaboration had been established culminating in the implementation of the edbm indexing software developed by Claude Goutorbe at MathDoc



- Essential in bringing the MATH database first on CD-Rom, than on the Web
- For the next ~15 years, the retrieval interval would carry the signature

**Zentralblatt MATH** : © 1999 [European Mathematical Society](#), [FIZ Karlsruhe](#) & [Springer-Verlag](#).  
[edbm/w3] Retrieval & display software : © 1999 [Cellule MathDoc](#), [UJF](#) & [CNRS](#).



# ... and maintaining a development cooperation

- Following a Grenoble workshop in 2009, a new versions were developed and maintained in Berlin, being the core of zbMATH Open retrieval for another decade (until being replaced by ElasticSearch).
- Another result of this visit was the usage of INRIA's Tralics software for the MATHML conversion of the database content, resulting in MATH display as early as 2010.

Zentralblatt MATH has released its [new interface!](#)  
For an improved author identification, see the [new author database](#) of ZBMATH.

[Read more](#) | [Try MathML](#) | [Hide](#)

## Zentralblatt MATH - ZBMATH Online Database



### ZBMATH - The database Zentralblatt MATH

The ZBMATH Database contains more than 3 million entries drawn from about 3500 journals and 1100 serials from 1826 to present.

This database is edited by

- the European Mathematical Society,
- FIZ Karlsruhe,
- Heidelberger Akademie der Wissenschaften.

Query:

Enter a query and click »Search«...

Clear

Search

### Facts and Figures:

■ 3064813 items indexed | ■ 53777 items added in 2011 | ■ 6231 active reviewers

The Zentralblatt MATH Database is produced by the Berlin editorial office of FIZ Karlsruhe (in cooperation with European academies and mathematical institutes).

The [One-line Search](#) offers a number of new functions. It is aimed at making the use of our database easier. Should you, however, prefer to stick to the search environment you are used to, please select [Advanced Search](#).

Without specifying a search field, the basic index is searched. If the number of hits surpasses a threshold, you may simply refine your query without leaving the hit list.

In this paper, the authors introduce a  $\bar{\partial}$ -analog of differential characters for complex manifolds and studied using a new theory of homological spark complexes. There are two graded ring homomorphisms:

$$\delta_1: \hat{H}^{n+1}(X, p) \rightarrow \mathcal{X}_2^{n+1}(X, p) \text{ and } \delta_2: \hat{H}^{n+1}(X, p) \rightarrow H^n(X; \mathbb{Z})$$

where  $\mathcal{X}_2^{n+1}(X, p)$  is the closed differential forms with certain integrality properties. The kernel of  $\delta_1$  is Deligne cohomology, the kernel of  $\delta_2$  corresponds to classes with smooth representatives. These homomorphisms sit in an exact functorial  $3 \times 3$  grid.

One very interesting result is the following  $3 \times 3$  grid for a compact Kähler manifold  $X$ :

$$\begin{array}{ccccccc} & & 0 & & 0 & & \\ & & \downarrow & & \downarrow & & \\ 0 & \rightarrow & \mathcal{F}_2(X) & \rightarrow & \hat{H}_2^{2p-1}(X, p) & \rightarrow & \bar{\partial} \mathcal{E}^{2p-1}(X, p) \rightarrow 0 \\ & & \downarrow & & \downarrow & & \\ 0 & \rightarrow & H_2^{2p}(X, \mathbb{Z}(p)) & \rightarrow & \hat{H}_2^{2p-1}(X, p) & \xrightarrow{\delta_1} & \mathcal{X}_2^{2p}(X, p) \rightarrow 0 \\ & & \downarrow & & \downarrow & & \downarrow \\ 0 & \rightarrow & \text{Hdg}^{p,p}(X) & \rightarrow & H^{2p}(X; \mathbb{Z}) & \xrightarrow{\gamma_p} & H_2^{2p}(X, p) \rightarrow 0 \\ & & \downarrow & & \downarrow & & \downarrow \\ & & 0 & & 0 & & 0 \end{array}$$

## ... which supported lots of features such as author database etc. (I)

- zbMATH author database was introduced (somewhat late) in 2010, and the author disambiguation has been gradually extended to all historical content and adapted to challenging issues such as Chinese names, varying transliterations etc.
- authorship assignments now unique (with sufficient certainty) for 97.5% of the signatures (thereof 30% manually checked)
- External IDs matched and maintained for up to 18 services like Wikidata, Math Genealogy, ORCID, Google Scholar, Idref, dblp, carmin.tv etc. ..., allowing for detailed, interconnected profile information

**Demailly, Jean-Pierre** (b. 1957 d. 2022)

[Edit Profile](#)

Author ID: [demailly,jean-pierre](#)

[Co-Author Distance](#)

Published as: [Demailly, Jean-Pierre](#); [Demailly, J.-P.](#); more...

Homepage: <http://www-fourier.ujf-grenoble.fr/~demailly/>

External Links: [MGP](#) · [ORCID](#) · [Wikidata](#) · [Google Scholar](#) · [ResearchGate](#) · [Math-Net.Ru](#) · [GND](#) · [IdRef](#) · [theses.fr](#)

Videos: [carmin.tv](#)

Documents Indexed: 131 Publications since 1978, including 9 Books and 2 Additional arXiv Preprints  
9 Contributions as Editor · 3 Further Contributions

Reviewing Activity: 12 Reviews

Biographic References: 7 Publications

Co-Authors: 82 Co-Authors with 55 Joint Publications  
1,494 Co-Co-Authors

Co-Authors

[all](#)

84 single-authored  
20 [Peternell, Thomas Martin](#)  
7 [Campana, Frédéric](#)  
5 [Hulek, Klaus](#)  
5 [Schneider, Michael](#)  
4 [Păun, Mihai](#)

Serials

[all](#)

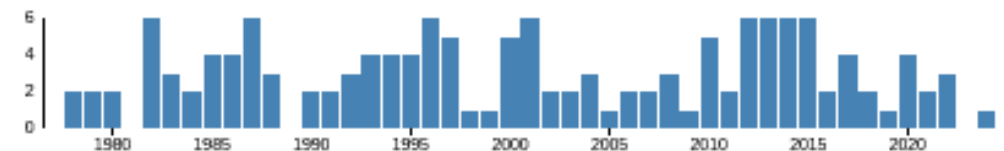
6 [Oberwolfach Reports](#)  
5 [Gazette des Mathématiciens](#)  
5 [Comptes Rendus de l'Académie des Sciences. Série I](#)  
4 [Compositio Mathematica](#)  
4 [Inventiones Mathematicae](#)

Fields

[all](#)

123 Several complex variables and analytic spaces (32-XX)  
54 Algebraic geometry (14-XX)  
24 Differential geometry (53-XX)  
14 Global analysis, analysis on manifolds (58-XX)  
13 General and overarching topics; collections (00-XX)

Publications by Year



Citations contained in zbMATH Open

[all cited Publications](#)

112 Publications have been cited 3,959 times in 2,285 Documents

Cited by ▼ Year


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**FIZ Karlsruhe**<sup>®</sup>  
Leibniz Institute for Information Infrastructure

While some authors have >20 spellings,  
there are currently 401 uniquely identified  
Persons named Wang, Wei in the database.




- For more than 10 years, the zbMATH author disambiguation framework is developed and maintained by Nicolas Roy...

**Chebyshev, Pafnutii L'vovich** (b. 1821 d. 1894)

**Author ID:** chebyshev.p-l 

**Published as:** Chebyshev, P. L.; Tschebyscheff, P. L.; Tschebyschew, P. L.; Tchebycheff; Tch bycheff; Tchebycheff, P.; Tch bycheff, P.; Tchebichef, P.; Tschebyscheff, P.; Tschebyschew, P.; Tschebychew, P.; Ćebiřev, P. L. [less](#)

**Further Spellings:** Чебышёв Пафнутий Львович

**External Links:** [MacTutor](#)  · [MGP](#)  · [Wikidata](#)  · [Math-Net.E](#)

**Found 401 Authors** (Results 1–100)

Found 401 Authors (Results 1–100)

Alphabetically Citations

Filter Results by

### Main Field

68-XX (64)  
90-XX (53)  
93-XX (49)

### External Link

ORCID (52)  
dblp (48)  
Homepage (29)

366











**30.**

## Fragen über Fuhrwerkkräder.

(Von Herrn B. auf der Insel Rügen.)

I. Wenn die Achse  $C$  (Taf. V.) eines Wagenrades  $PQ$ , welches sich um die Achse dreht, auf *geradliniger* Bahn  $PQ_6$  mit *gleichförmiger* Geschwindigkeit fortgezogen, nach  $C_1, C_2, C_3, C_4, C_5, C_6$  gelangt, so durchläuft der Punkt  $P$  der Reihe nach die Cykloidenbogen  $PP_1, PP_2, PP_3, PP_4, PP_5, PP_6$ ; der dem Punkte  $P$  im Durchmesser gegenüberliegende Punkt  $Q$  aber *gleichzeitig* die Cykloidenbogen  $QQ_1, QQ_2, QQ_3, QQ_4, QQ_5$  und  $QQ_6$ ; denn es ist  $PP_1 = P_1P_1, PP_2 = P_2P_2$ , u. s. w. Die Bogen  $PP_1, PP_2, PP_3, PP_4$  und  $PP_5$  sind aber *kürzer*, als die Bogen  $QQ_1, QQ_2, QQ_3, QQ_4$  und  $QQ_5$ ; erst der Cykloidenbogen  $PP_6$  ist dem  $QQ_6$  *gleich*. Wie erklärt es sich nun, daß die beiden *fest mit einander verbundenen Punkte*

**Roy, Nicolas David**

**Author ID:** roy.nicolas.1   
**Published as:** Roy, Nicolas; Roy, Nicolas D.; [more...](#)  
**External Links:** [ORCID](#)  · [arXiv](#)  · [Google Scholar](#)  · [ResearchGate](#)  · [MathOverflow](#)  · [dblp](#)  · [GND](#)   
[IdRef](#)  · [theses.fr](#) 

**Documents Indexed:** 14 Publications since 2004, including 2 Additional arXiv Preprints  
1 Further Contribution

Reviewing Activity: 3 Reviews

Wang, Wei

51 Publications (2009–2025)  
indexed  
1,546 Citations

**Co-Authors:** Wen, Changyun; Huang, Jiangshuai; Zhou, Jing;

**Main Fields:** Systems theory; control (93-XX)

Published as: Wang, Wei

Wang, Wei

115 Publications (1989–2025)  
indexed  
1,263 Citations

5) **Co-Authors:** Wang, Dong; Sun, Ximing; Zhuang, Yan; ...  
**Main Fields:** Systems theory; control (93-XX); Computer science (68-XX)

Published as: Wang, Wei; Wang, W.

Wang, Wei

105 Publications (1995–2025)  
indexed  
553 Citations

5) **Co-Authors:** Yang, Zishen; Zhang, Hao; Qiu, Lihong; ...  
**Main Fields:** Combinatorics (05-XX)  
**Published as:** Wang, Wei

Wang, Wei

82 Publications (1994–2025)

**Co-Authors:** Shi, Yun; Chang, Der-Chen E.; Wu, Qingyan; ...

... who, of course, did his thesis in Grenoble!

## Notes

**Note publique d'information :**  
Titulaire d'un doctorat de l'Université Joseph Fourier de Grenoble, spécialité "Mathématiques"

Note publique d'information :

En poste : Mathematics Department, FIZ Karlsruhe, Berlin, Allemagne (en 2017)

zbMATH  Open

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# Supporting integrity of mathematical research

In collaboration with the European Mathematical Society through its committees, MathDoc and zbMATH representatives helped to formulate guidelines such as <https://euromathsoc.org/predatory-publishing> to battle problematic publishing behaviour.

On the zbMATH side, this led to a discontinuation of indexing for many journals.

Unfortunately, this is an ongoing issue (example from yesterday).

## Advances in Pure Mathematics

78 Articles (2011–2014)  
indexed  
95 Citations

**Publisher:** Scientific Research Publishing, Irvine, CA  
**Short Title:** Adv. Pure Math.  
**Main Fields:** Functions of a complex variable (30-XX); Partial differential equations (35-XX); Operator theory (47-XX); ...

## Applied Mathematics

15 Articles (2010–2011)  
indexed  
18 Citations

**Publisher:** Scientific Research Publishing, Irvine, CA  
**Short Title:** Appl. Math., Irvine  
**Main Fields:** Ordinary differential equations (34-XX); Partial differential equations (35-XX); Harmonic analysis on Euclidean spaces (42-XX); ...

## Open Journal of Discrete Mathematics

33 Articles (2011–2012)  
indexed  
59 Citations

**Publisher:** Scientific Research Publishing, Irvine, CA  
**Short Title:** Open J. Discrete Math.  
**Main Fields:** Combinatorics (05-XX); Number theory (11-XX); Numerical analysis (65-XX); ...

## ANALYSIS AND PROOF OF THE RIEMANN HYPOTHESIS

Bahattin Gunes

Department of Mathematics,  
Istanbul Technical University, Ayazaga, TURKEY

E-mail : bahgunes@yahoo.com

(Received: May 18, 2025 Accepted: Jun. 28, 2025 Published: Jun. 30, 2025)

**Abstract:** We propose a proof for the Riemann Hypothesis by dividing the Dirichlet eta function into a main term and a remainder term, focusing primarily on the behavior of the remainder in the critical strip ( $0 < \sigma < 1$  where  $s = \sigma + it$ ). Then, we express the Riemann zeta function using the same decomposition and show that its main term cannot vanish at the nontrivial zeros. Finally, we focus on the limit on the main terms as  $|\lim_{k \rightarrow \infty} \zeta_k(s_0)/\zeta_k(1-s_0)|$ .



# Pursuing a Global Digital Mathematics Library (I) – Early efforts to make math fulltexts OA

After the European Mathematical Society (EMS) joined the zbMATH institutions, in 1999, there has been a number of joint projects with MathDoc to make the math literature accessible, such as LIMES, EMANI, EuDML (usually involving NUMDAM and EMIS fulltexts as well as zbMATH data).

## EuDML Network

- EuDML Initiative

- Partners

- Statutes

- Policies

- Governing

- Become a Partner

## Developers Corner

## Partners

The EuDML Initiative has been established in February 2014 by the following 12 partners:

- The European Mathematical Society

- FIZ Karlsruhe – Leibniz Institut für Informationsinfrastruktur GmbH

- Interdisciplinary Centre for Mathematical and Computational Modelling, University of Warsaw

- Université Grenoble Alpes



Since then, also the head of MathDoc has been one of the EMS representatives in the zbMATH advisory board.

# Pursuing a Global Digital Mathematics Library (II) – Political support for Open Infrastructures

Under the auspices of the IMU, the vision of a World Digital Mathematics Library (since 2014 Global Mathematics Library, GDML) has been pursued with the aim of connecting an interconnected infrastructure of open mathematical resources (strongly driven by various representatives of MathDoc and zbMATH, who maintained the largest active components of a future GDML).

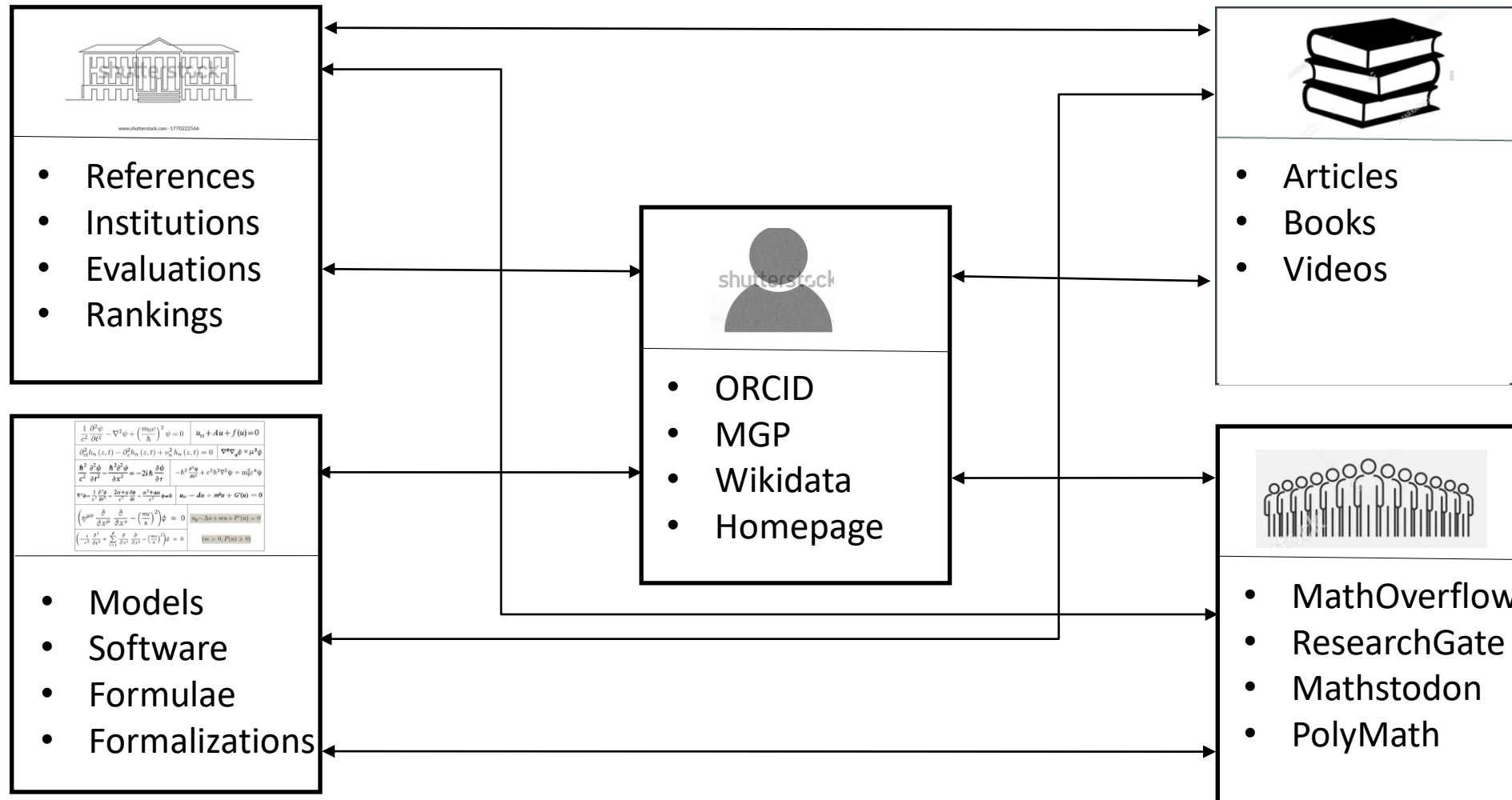
[Note that maintenance usually also means frequently development of new platforms according to evolving standards!]

Ideas and policies created in the GDML framework were essential in the transformation of zbMATH (which was subscription-based until 2020) into an open service.

zbMATH Open provides now APIs and tools that facilitate a seamless connection to many open resources.

The screenshot shows the Geodesic search engine interface. At the top, the Geodesic logo is visible. Below it, the search results for 'Theory of capacities' by Choquet, Gustave are displayed. The results include the title, author, and a link to the original article notice from Numdam. A PDF icon is shown next to the article title. The abstract section is expanded, showing the text: 'C'est un essai de théorie générale des fonctions croissantes...'. Below the abstract, there is a search bar with the text 'en:geodesic' and a 'Mark All' button. The results section shows 'Found 101,305' results. The article information section is expanded, showing the title, author, and a link to the original article notice. The results are filtered by 'Access' and 'Document Type'.

# Interlinking mathematical resources (ongoing)



## Some decades of matching tools

Naturally, creating and maintaining such a heterogenous framework requires not just open data but appropriate APIs and matching tools (again, a story which begins here with Claude's citation matcher for NUMDAM, see <https://eudml.org/doc/221170>)

Based on this ideas, more tools have been developed which serve on the zbMATH side purposes such as

- Interlinking digital mathematics libraries (NUMDAM, EuDML, Geodesic..., since 2011)
- Identifying mathematical software references to create the swMATH database (since 2012)
- Reference matching to create the citation database (since 2013)
- Identifying and matching arXiv versions of published documents (since 2015) and identify the complementary set for preprint indexing (2022)
- Interlinking platforms such as MathOverflow (since 2017) and mathematical research data (DLMF, OEIS, ATLAS..., since 2022)
- Mathematical entity linking (EoM, Wikipedia..., since 2025)



# Interlinking mathematical resources (example)

zbMATH Open

DocumentsAuthorsSerialsSoftwareClassificationFormulæ

Structured Search

in:0848.05002

FieldsOperators

Help

**Petkovšek, Marko; Wilf, Herbert S.; Zeilberger, Doron**  
 *$A = B$ . With foreword by Donald E. Knuth.* (English) [Zbl 0848.05002](#)  
Wellesley, MA: A. K. Peters. xii, 212 p. (1996).

This book is an essential resource for anyone who ever encountered binomial coefficient identities, for anyone who is interested in how computers are being used to discover and prove mathematical identities, or for anyone who wants to see a well-written book that presents interesting, cutting edge mathematics in an accessible style. The book is written by a group of three researchers who have found and implemented algorithmic approaches to the study of hypergeometric series. In this book, they detail where to find the packages that implement these algorithms, either Maple or Mathematica, they give examples of and instructions in how to use these packages, and they explain the motivation and theory behind the algorithms. The specific algorithms that are described are Sister Celine's Method, an algorithm from the 1940's that underlies most of the current research; Gosper's Algorithm, the first of the powerful proof techniques to be implemented with a computer algebra package; Zeilberger's Algorithm which extends and generalizes Gosper's approach; the WZ Method which is guaranteed to provide a proof certificate for any correct identity for hypergeometric series and which can be used to determine whether or not a "closed form" exists for any given hypergeometric series. The book is also sprinkled with examples, exercises, and elaborations on the ideas that come into play.

Reviewer: D.M.Bressoud (St.Paul)

**MathOverflow Questions:**  
[Limit of a sum with binomial coefficients](#)

- MSC:**
- [05A10](#) Factorials, binomial coefficients, combinatorial functions
  - [05A30](#)  $q$ -calculus and related topics
  - [33C20](#) Generalized hypergeometric series,  ${}_pF_q$
  - [68R05](#) Combinatorics in computer science
  - [33D15](#) Basic hypergeometric functions in one variable,  ${}_r\phi_s$
  - [39A70](#) Difference operators

**Keywords:**  
binomial coefficient identities; hypergeometric series; algorithms; Maple; Mathematica; Sister Celine's Method; Gosper's Algorithm; Zeilberger's Algorithm; WZ Method

**Software:**  
Mathematica; qEKHAD; Maple

[PDF](#) [BibTeX](#) [XML](#) [Cite](#)

**Digital Library of Mathematical Functions:**  
[§16.23\(iv\) Combinatorics and Number Theory](#) • [§16.23 Mathematical Applications](#) • [Applications](#) • [Chapter 16 Generalized Hypergeometric Functions and Meijer G -Function](#)

[Online Encyclopedia of Integer Sequences](#)

swMATH

DocumentsAuthorsSerialsSoftwareClassificationFormulæ

Structured Search

si:554

FieldsOperators

Help

To prove that  $\sum_{k=0}^n \binom{n}{k} x^k = (1+x)^n$  as it is confirmed by using Maple, Mathematica, or Wolfram Alpha.

**Related Software:** Maple; Matlab; R; SageMath; MACSYMA; DLMF; REDUCE; Magma; OEIS; SINGULAR; GAP; Macaulay2; Theorema; MPFR; Maxima; AXIOM; GitHub; Python; PARI/GP; Mathcad

**Cited in:** 6,255 Publications  
This software is also referenced in ORMS.

**Further Publications:** <http://www.wolfram.com/books/>

**Standard Articles**

7 Publications describing the Software, including 7 Publications in zbMATH	Year
The <i>Mathematica</i> book. Version 4. 4th ed. <a href="#">Zbl 0924.65002</a> Wolfram, Stephen	1999
The <i>Mathematica</i> book. Version 3.0. 3rd ed. <a href="#">Zbl 0876.65001</a> Wolfram, Stephen	1996
Mathematica 3.0 standard add-on packages: the official guide to over a thousand additional functions for use with Mathematica 3.0. <a href="#">Zbl 0961.68047</a> Wolfram, Stephen	1996
Mathematica: a system for doing mathematics by computer. 2nd ed. <a href="#">Zbl 0925.65002</a> Wolfram, Stephen	1992
Mathematica. Quick reference. Version 2. With help from: Robert Campbell. <a href="#">Zbl 0817.68036</a> Blachman, Nancy	1992
Mathematica. Ein System für Mathematik auf dem Computer. (Mathematica. A system for doing mathematics by computer). 2. ed. (Mathematica. Ein System für Mathematik auf dem Computer.) <a href="#">Zbl 0853.65001</a> Wolfram, Stephen	1992
Mathematica: A system for doing mathematics by computer. <a href="#">Zbl 0671.65002</a> Wolfram, Stephen	1988

**Cited by 8,560 Authors**

53 Stanimirović, Predrag S.	179 Applied Mathematics and Computation	1,503 Numerical analysis (65-XX)
41 Sharma, Janak Raj	150 Computer Physics Communications	1,257 Computer science (68-XX)
38 Prokopenya, Alexander N.	122 Journal of High Energy Physics	646 Partial differential equations (35-XX)
33 Kim, Young Ik	113 Journal of Computational and Applied Mathematics	484 Ordinary differential equations (34-XX)
30 Soleymani, Fazlollah	90 Journal of Symbolic Computation	478 Quantum theory (81-XX)

**Cited in 1,192 Serials**

**Cited in 62 Fields**

**Citations by Year**

Just the sequence  $\ln[1]=$   $\ln[2]=$   $\ln[3]=$   $\ln[4]=$   $\ln[5]=$   $\ln[6]=$   $\ln[7]=$   $\ln[8]=$   $\ln[9]=$   $\ln[10]=$   $\ln[11]=$   $\ln[12]=$   $\ln[13]=$   $\ln[14]=$   $\ln[15]=$   $\ln[16]=$   $\ln[17]=$   $\ln[18]=$   $\ln[19]=$   $\ln[20]=$   $\ln[21]=$   $\ln[22]=$   $\ln[23]=$   $\ln[24]=$   $\ln[25]=$   $\ln[26]=$   $\ln[27]=$   $\ln[28]=$   $\ln[29]=$   $\ln[30]=$   $\ln[31]=$   $\ln[32]=$   $\ln[33]=$   $\ln[34]=$   $\ln[35]=$   $\ln[36]=$   $\ln[37]=$   $\ln[38]=$   $\ln[39]=$   $\ln[40]=$   $\ln[41]=$   $\ln[42]=$   $\ln[43]=$   $\ln[44]=$   $\ln[45]=$   $\ln[46]=$   $\ln[47]=$   $\ln[48]=$   $\ln[49]=$   $\ln[50]=$   $\ln[51]=$   $\ln[52]=$   $\ln[53]=$   $\ln[54]=$   $\ln[55]=$   $\ln[56]=$   $\ln[57]=$   $\ln[58]=$   $\ln[59]=$   $\ln[60]=$   $\ln[61]=$   $\ln[62]=$   $\ln[63]=$   $\ln[64]=$   $\ln[65]=$   $\ln[66]=$   $\ln[67]=$   $\ln[68]=$   $\ln[69]=$   $\ln[70]=$   $\ln[71]=$   $\ln[72]=$   $\ln[73]=$   $\ln[74]=$   $\ln[75]=$   $\ln[76]=$   $\ln[77]=$   $\ln[78]=$   $\ln[79]=$   $\ln[80]=$   $\ln[81]=$   $\ln[82]=$   $\ln[83]=$   $\ln[84]=$   $\ln[85]=$   $\ln[86]=$   $\ln[87]=$   $\ln[88]=$   $\ln[89]=$   $\ln[90]=$   $\ln[91]=$   $\ln[92]=$   $\ln[93]=$   $\ln[94]=$   $\ln[95]=$   $\ln[96]=$   $\ln[97]=$   $\ln[98]=$   $\ln[99]=$   $\ln[100]=$   $\ln[101]=$   $\ln[102]=$   $\ln[103]=$   $\ln[104]=$   $\ln[105]=$   $\ln[106]=$   $\ln[107]=$   $\ln[108]=$   $\ln[109]=$   $\ln[110]=$   $\ln[111]=$   $\ln[112]=$   $\ln[113]=$   $\ln[114]=$   $\ln[115]=$   $\ln[116]=$   $\ln[117]=$   $\ln[118]=$   $\ln[119]=$   $\ln[120]=$   $\ln[121]=$   $\ln[122]=$   $\ln[123]=$   $\ln[124]=$   $\ln[125]=$   $\ln[126]=$   $\ln[127]=$   $\ln[128]=$   $\ln[129]=$   $\ln[130]=$   $\ln[131]=$   $\ln[132]=$   $\ln[133]=$   $\ln[134]=$   $\ln[135]=$   $\ln[136]=$   $\ln[137]=$   $\ln[138]=$   $\ln[139]=$   $\ln[140]=$   $\ln[141]=$   $\ln[142]=$   $\ln[143]=$   $\ln[144]=$   $\ln[145]=$   $\ln[146]=$   $\ln[147]=$   $\ln[148]=$   $\ln[149]=$   $\ln[150]=$   $\ln[151]=$   $\ln[152]=$   $\ln[153]=$   $\ln[154]=$   $\ln[155]=$   $\ln[156]=$   $\ln[157]=$   $\ln[158]=$   $\ln[159]=$   $\ln[160]=$   $\ln[161]=$   $\ln[162]=$   $\ln[163]=$   $\ln[164]=$   $\ln[165]=$   $\ln[166]=$   $\ln[167]=$   $\ln[168]=$   $\ln[169]=$   $\ln[170]=$   $\ln[171]=$   $\ln[172]=$   $\ln[173]=$   $\ln[174]=$   $\ln[175]=$   $\ln[176]=$   $\ln[177]=$   $\ln[178]=$   $\ln[179]=$   $\ln[180]=$   $\ln[181]=$   $\ln[182]=$   $\ln[183]=$   $\ln[184]=$   $\ln[185]=$   $\ln[186]=$   $\ln[187]=$   $\ln[188]=$   $\ln[189]=$   $\ln[190]=$   $\ln[191]=$   $\ln[192]=$   $\ln[193]=$   $\ln[194]=$   $\ln[195]=$   $\ln[196]=$   $\ln[197]=$   $\ln[198]=$   $\ln[199]=$   $\ln[200]=$   $\ln[201]=$   $\ln[202]=$   $\ln[203]=$   $\ln[204]=$   $\ln[205]=$   $\ln[206]=$   $\ln[207]=$   $\ln[208]=$   $\ln[209]=$   $\ln[210]=$   $\ln[211]=$   $\ln[212]=$   $\ln[213]=$   $\ln[214]=$   $\ln[215]=$   $\ln[216]=$   $\ln[217]=$   $\ln[218]=$   $\ln[219]=$   $\ln[220]=$   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# Anchoring the needs of the mathematical community

Currently, UGR/MathDoc and FIZ/zbMATH Open are involved in further activities to ensure that the needs of the mathematical communities are addressed within large-scale information system

- Math representatives in the EOCS project LUMEN (approved/start in 2025; subject-specific functions for math in collaboration with other fields; involves also AI tools etc.)

Still, aspects such as the need of correctness and precision, longevity of results, and tools to address mathematical content like formulae remain fundamental.

Looking forward to the next 30 years of collaboration!

# Thank you!

