

European Digital Mathematics Library EuDML. Current State and Future Plans

Jiří Rákosník¹, Peter Stanchev^{2,3}, Radoslav Pavlov²

¹ Institute of Mathematics CAS, Czech Republic

² Institute of Mathematics and Informatics, BAS, Bulgaria

³ Kettering University, Flint, USA

rakosnik@math.cas.cz, pstanche@kettering.edu, radko@cc.bas.bg,

Abstract. EuDML makes the mathematics literature available online in the form of an enduring digital collection, developed and maintained by a network of institutions. EuDML is currently indexing more than 257 000 items across 14 collections. The current state and future plans are presented.

Keywords: Digital mathematics libraries, EuDML, EuDML Initiative, GDML

1 Introduction

The European Digital Mathematics Library [5] is an open repository of scholarly mathematical literature which was built in 2010–2013 in a project of 13 partners from 9 European countries partly supported by the European Commission. Its aim is to provide common framework, standards and services for a unified seamless access to the distributed heterogeneous local digital repositories containing relevant mathematical literature published in Europe including periodicals, selected monographs and conference proceedings from the past as well as the currently produced mathematical publications.

The selection of the digital content is following the three basic EuDML policies [11]:

- The texts in EuDML must have been scientifically validated and formally published.
- EuDML items must be open access after a finite embargo period. Once documents contributed to the library are made open access due to this policy, they cannot revert to close access later on.
- The digital full text of each item contributed to EuDML must be archived physically at one of the EuDML member institutions.

When the project and its external funding finished, 12 organizations including content providers, developers and other entities established an international association called the EuDML Initiative [6] in order to ensure the continuation and further development of the EuDML services. The European Mathematical Society [7] has a prominent role

in the association securing that the EuDML remains a sustainable public service to the world-wide scientific community. Among the partners there are also the Institute of Mathematics and Informatics BAS in Sofia and the Institute of Mathematics CAS in Prague which are curating national repositories, the Bulgarian Digital Mathematics Library (BulDML) [1] and the Czech Digital Mathematics Library (DML-CZ) [2], respectively, and providing its content to the EuDML.

2 The current state – content and usage

The system and the tools developed during the project proved to be efficient so that the EuDML has been maintained and continuously extended by a new content since the end of the project. The volume of the EuDML has increased by approx. 10% reaching more than 257,000 items including (as of 21 August 2016):

- 252,111 articles from 323 journals
- 2,249 individual contributions from 71 edited books
- 3,392 monographs
- 747 volumes from 295 multi-volume works

Two new collections have enlarged the group of content providers, namely the e-Library of the Mathematical Institute SASA in Belgrade [4] in 2014 (around 7,000 items) and the Journal of the European Mathematical Society published by the EMS Publishing House [8] and served to the EuDML through the DML-CZ since 2016 (around 700 articles).

An essential part of the EuDML consists of digitized old volumes, the distribution by years in Figure 1 shows that EuDML is virtually a living library in which the contemporary and the new-born literature is taking the lead.

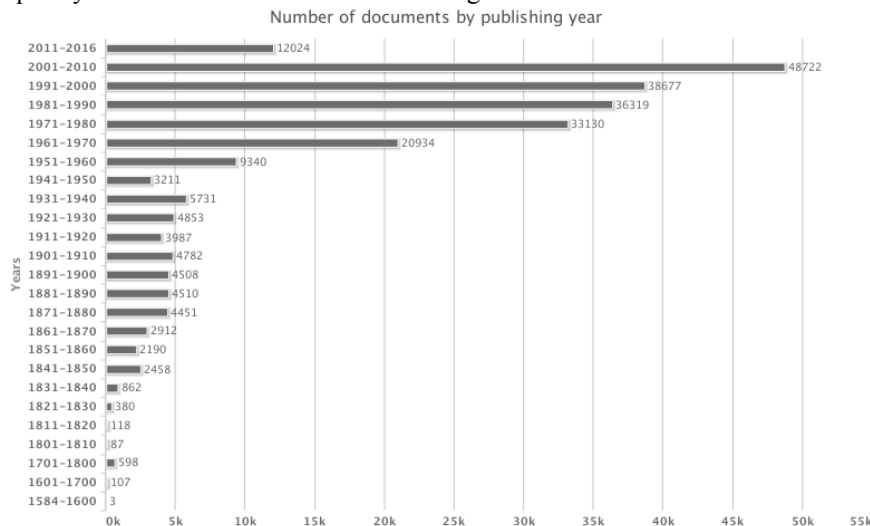


Fig. 1. Number of documents by year of publication

The lingua franca of today's mathematics is certainly English. However, essential part of the scholarly mathematical literature – and not only the older one – has been written in other languages. The appearance of documents in the EuDML according to different languages is illustrated in Figure 2.

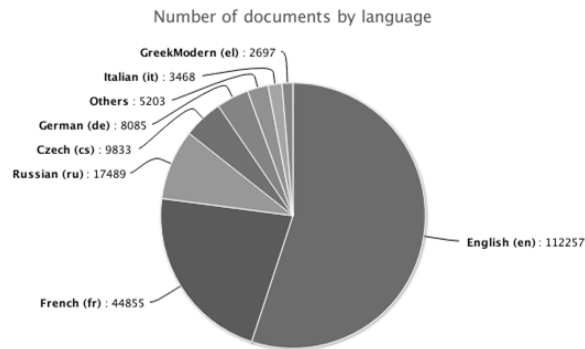


Fig. 2. Number of documents by language

Not only the content but also the EuDML environment is multilingual. The user can currently choose from 14 language versions of the web interface. The Bulgarian page is given in Figure 3.

EuDML | The EUROPEAN DIGITAL MATHEMATICS LIBRARY

български (bg) | Вход | Регистрация | (Защо да се регистрирам?)

Заглавие, Автор, Ключова дума, цитиране | Търсене

Начална страница | Разширено търсене | Преглед по теми | Преглед по списания

Референции

Търсене

Въведете Вашите условия и критерии за търсене

Заглавие, Автор, Ключова дума, цитиране, дата ... | Търсене

Разширено търсене

</> Embed EuDML Search on Your Website

Съвети за търсене

- Търсенето е без разлика за главни и малки букви и диакритични знаци, например: (Bézout=bezout)
- Търсенето на думи се извършва според точното изписване, например думите (theorem ≠ theorems) се приемат за различни
- Фрази се поддържат с цитат нотация - ("Uniformization theorem" ≠ Uniformization theorem=uniformization AND theorem)
- Заместващите символи * и ? могат да се използват (с изключение на фрази)

EuDML е индексирал съдържание от 255227 публикации в 14 колекции [поверете статистиката](#)

Какво е EuDML?

EuDML прави достъпна онлайн математическата литература публикувана в Европа. EuDML осигурява дългосрочно съхранение и достъп до дигитални колекции, разработени и поддържани от мрежа от институции.

**REGISTER FOR EuDML
FIND OUT THE BENEFITS**

Характеристики

1. Търсене и преглед на колекции
2. Откриване на релевантни публикации и списания
3. Запазете и споделете Вашите резултати от търсене

Разширено търсене

Преглед по теми

Преглед по списания

Последни новини

Hi! Is there an English version of this paper? [Вижте повече](#)

http://www.math.net.ru/php/person.php?option_lang=rus&personid=27537

<https://scholar.google.com/citations?user=RPILy08AAAAJ&hl=ru&oi=ao> [Вижте повече](#)

За проекта | Обратна връзка | version 2.1.6

EuDML

Fig. 3. Bulgarian version of the EuDML homepage

Nevertheless, mathematics has always been extremely international discipline, and the EuDML is open to users all over the world. Currently, we have 1000 visitors/day, and this amount has been rather stable since the release of the EuDML in 2012 (it slightly depends on the season of the year, of course, see Figure 4).

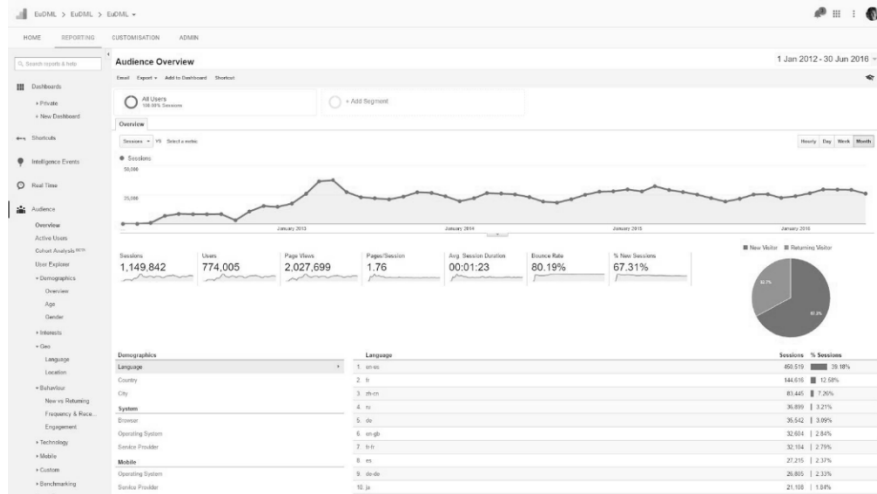


Fig. 4. Usage of the EuDML over the years. Source: Google Analytics

Sources of the traffic, by country is given in Table 1. As expected, the system has significant popularity in European countries. However, the number of visits from overseas is substantial as well.

Table 1. Traffic by country

Country	Number of sessions	% of Total
Total	1,149,842	100.0%
1. U.S.A.	159,078	13.8%
2. France	117,176	10.2%
3. Germany	84,378	7.3%
4. China	67,794	5.9%
5. Italy	44,800	3.9%
6. India	41,014	3.6%
7. Japan	39,281	3.4%
8. Russia	38,650	3.4%
9. United Kingdom	38,557	3.3%
10. Canada	26,545	2.3%

Of course, a simple count of visits does not distinguish between those who look in the EuDML just by coincidence and who really worked with the content. The user engagement is presented in Table 2. It is clear, that EuDML is used mainly to access the content. Typically, users visit it to get content of the article linked from elsewhere. It seems that it is result of careful design to make the EuDML easily indexable, which helps users to easily access it.

Table 2. User engagement

Session duration	Sessions	Page views
0–10 seconds	938,403	958,341
11–30 seconds	29,654	73,708
31–60 seconds	28,709	80,889
61–180 seconds	51,693	173,994
181–600 seconds	53,335	239,335
601–1.800 seconds	39,262	252,954
1.800+ seconds	8,786	248,468

The list of the five top referrals to the system with the exclusion of Google basic search is presented in Table 3. Apparently, Google Scholar is significant source of the traffic for the system. EuDML is being used to cite publications in Wikipedia, it also appears in Q&A sites, which seems to be a positive feature.

Table 3. Referrals to EuDML

	Source	Sessions	New sessions	New users
	Total	83,746	63.9%	53,532
1.	scholar.google.com	12,273 (14.7%)	59.7%	7,322 (13.7%)
2.	zbmath.org	4,584 (5.5%)	39.3%	1,803 (3.4%)
3.	scholar.google.fr	2,585 (3.1%)	67.2%	1,738 (3.3%)
4.	mathematik.unibielefeld.de	2,502 (3.0%)	60.2%	1,505 (2.8%)
5.	en.wikipedia.org	2,110 (2.5%)	82.6%	1,742 (3.3%)
6.	bdim.eu	2,025 (2.4%)	59.3%	1,200 (2.2%)
7.	scholar.google.de	1,829 (2.2%)	70.5%	1,290 (2.4%)
8.	scholar.google.gr	1,667 (2.0%)	71.3%	1,188 (2.2%)
9.	mathoverflow.net	1,600 (1.9%)	60.6%	970 (1.8%)
10.	math.stackexchange.com	1,313 (1.6%)	75.9%	997 (1.9%)

3 Future plans

The EuDML naturally has a strong European character due to the facts that the project has been partly funded by the EU, the current partners and the digital content come from European countries, the EuDML is running under the patronage of the European Mathematical Society. It is so far the only verified functional prototype of a full-fledged digital library for mathematics with a critical mass of content. As such it has been recognized as an important step towards the Global Digital Mathematical Library [9] envisioned by the International Union of Mathematicians [10].

Even though the lack of stable external funding hinders major technological development the establishment of the EuDML Initiative and the system of responsibilities distributed among partners guarantees the maintenance and sustainability of the

EuDML. Its content is continuously growing with the new material in the partnering repositories. One of them, the Electronic Library of Mathematics (eLibM) [3] operated by the EuDML partner FIZ Karlsruhe is currently building a new publishing platform which would bring along further publishers and periodicals.

Inviting new partners and including their material is major task for the near future. There are number of possible candidates whose digital content and metadata satisfy the DML standards, for instance SwissDML, Mathematica Scandinavica, the Russian digital library MathNet.Ru, the Japanese digital library J-Stage, proceedings of the International and European Congresses of Mathematics etc. The priorities should be specified by the Scientific Advisory Board [12] nominated by the European Mathematical Society.

4 Conclusions

During the three years of its existence the EuDML proved to be a functional prototype of a full-fledged digital library for mathematics providing a free access to a critical mass of documents. Its volume is continuously growing and new partnerships are negotiated. As such the EuDML represents an essential step towards the Global Digital Library of Mathematics.

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