The European Digital Mathematics Library

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DiPP 2013, Veliko Tarnovo
Why

- Mathematical validated literature
  - forms an edifice whose individual building blocks remain in the construction for ever
  - does not get obsolete, new results do not supersede older ones
  - remains valid only in its entirety, building a wide network of references
  - provides timeless utility to other fields

Mathematics is beautiful: What was true yesterday is still true today.

Jaroslav Kurzweil
Mathematical literature is ever growing

- Mathematical validated literature is an edifice whose individual building blocks remain in the construction for ever
- Permanently accelerating growth
  - < 10 % before 1900
  - > 70 % after 1950
- > 100 000 new publications a year
- Interdependence
  - 1/2 of citations aim more than 10 years back
  - 1/4 of citations aim more than 20 years back

Five-year increments in zbMATH
• We need a reference library
  – exhaustive
  – up-to-date
  – well organized
  – widely open
  – easy to use for non-mathematicians
• Electronic approach offers a solution:
  – new publications are prepared in electronic form
  – the old ones are being digitized in numerous projects
• However:
  – efforts are not well coordinated and do not systematically cover the literature
  – digital documents are often duplicated among various providers
  – serials are often split across providers
  – good access requires numerous subscriptions and complicated search
  – permanent reliable access is not guaranteed
What

• The European Digital Mathematics Library as a complex solution with the aims
  – to create a common infrastructure for seamless navigation, searching and interacting within the deeply interlinked network of distributed validated multilingual digital mathematical content available throughout Europe, which will make mathematics readily available for all users
  – to provide a safe archival back-end so that publishers do not have to maintain their back catalogues indefinitely, and thus agree to transfer their content and to license eventual open access to it according to their moving wall policy
  – to satisfy the demand for reliable and long-term availability of mathematical research output
The project

- Project partly financed by the EC Competitiveness and Innovation Framework Programme
  - Information and Communications Technologies Policy Support Programme / Open Access to Scientific Information
- 3.2 M€ (1.6 M€ from the EC)
- February 2010 – January 2013
System architecture

- **Metadata Repository** – the central point of reference managing a replica of all metadata for all items in the different local repositories
- **Search Engine** – to search and item identifier resolution facilities
- **Metadata Enhancer** – collection of tools to expand or complete the metadata existing by content providers (OCR over full texts, multilingual metadata, generating MathML, etc.)
- **Association Analyser** – to detect, analyse and record relations between individual items
System architecture

- **Annotation Component** – mechanisms to attach new material to individual items in the repositories and maintain this new material
- **Accessibility Component** – support for enhancing accessibility of items, if required, before presentation to end users
- **Web User Interface and External Services Interface** – to provide access to the collected resources system to human and machine users and interfaces for integration of third party services
Project structure

WP 1
Project Management

WP 2
Policies, exploitation, and dissemination

WP 6
Web and service interface implementation

WP 9
Annotation component implementation

WP 10
Accessibility component implementation

WP 3
Content aggregation

WP 4
System architecture and design

WP 5
Metadata repository and search engine implementation

WP 7
Metadata enhancer implementation

WP 8
Association analyser implementation

WP 11
Assessment and evaluation
Core services overview

- REPOX – framework for managing metadata spaces
- YADDA – main data repository
Processing workflow

fulltext-processing (~7d), eudml-indexing (~33h), zbl-match-ref (~18h), gensim-training (~17h), gensim-indexing (~14h) ….
Content aggregation

To aggregate all the metadata contributed to the project in a single repository and format
Metadata schema

• Content analysis
• Providers feedback
• Common EuDML metadata schema – JAT Suite (Journal archiving and interchange tag, U.S. National Library of Medicine)
• Metadata harvest
• Final version of EuDML metadata schema, JATS NISO 1.0
EuDML metadata schema specification (v2.0 - final)

The EuDML metadata schema version 2.0 as defined by deliverable D3.6 is implemented in two XML schemas providing the 2 root elements holding XML metadata for two major types of items, namely journal articles and books.

A consequence of this choice is that:

- There is no separate schema for book parts (typically individual articles in a proceedings volume); these are described and exchanged within the whole book record they belong to.
- There is no separate schema for multi-volume works. Instead a book record may carry the description of the multi-volume work it belongs to, if any.

Journal articles are described with unmodified Journal Archiving and Interchange Tag Set, NISO version 1.0 XML schema structure with root element <article>. However, as the NISO schema lacks a namespace declaration, the formal specification of the journal article schema, located at http://eudml.org/schema/2.0/eudml-article-2.0.xsd adds the definition of the target namespace "http://jats.nlm.nih.gov" to the standard XML schema definition. There are no other modifications to the standard.

Structured documentation for this schema is available at

www.project.eudml.org
# Content aggregation

<table>
<thead>
<tr>
<th>Item type</th>
<th>Number of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal article</td>
<td>221,293</td>
</tr>
<tr>
<td>Proceedings contribution</td>
<td>2,962</td>
</tr>
<tr>
<td>Book chapter</td>
<td>42,520</td>
</tr>
<tr>
<td>Book: monograph</td>
<td>1,724</td>
</tr>
<tr>
<td>Book: conference</td>
<td>66</td>
</tr>
<tr>
<td>Book: volume</td>
<td>1,179</td>
</tr>
<tr>
<td>Multiple volume book</td>
<td>296</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>270,040</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Projects</th>
<th>Contributed</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDZ, ElibM</td>
<td>100,000</td>
</tr>
<tr>
<td>Gallica, NUMDAM, CEDRAM</td>
<td>57,000</td>
</tr>
<tr>
<td>DML-CZ</td>
<td>28,000</td>
</tr>
<tr>
<td>RusDML</td>
<td>17,000</td>
</tr>
<tr>
<td>DML-PL</td>
<td>14,000</td>
</tr>
<tr>
<td>DML-E</td>
<td>6,400</td>
</tr>
<tr>
<td>HDML</td>
<td>3,000</td>
</tr>
<tr>
<td>BDIM</td>
<td>2,000</td>
</tr>
<tr>
<td>BulDML</td>
<td>1,700</td>
</tr>
<tr>
<td>SPM/BNP</td>
<td>1,300</td>
</tr>
</tbody>
</table>
EuDML policies

• 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.
Sustainability – EuDML Initiative

- Association without legal personality
  - The European Mathematical Society
  - Fachinformationszentrum Karlsruhe (Zentralblatt MATH Berlin)
  - Interdisciplinary Centre for Math. and Computational Modelling, Univ. of Warsaw
  - Cellule MathDoc, Université Joseph Fourier, Grenoble
  - Institute of Mathematics of the ASCR, v. v. i., Praha
  - University of Birmingham
  - Institute of Mathematics and Informatics BAS, Sofia
  - Ionian University, Corfu
  - Società Italiana per la Matematica Applicata e Industriale
  - Unione Matematica Italiana
  - Niedersächsische Staats- und Universitätsbibliothek Göttingen
Advanced Search

Match All of the following rules

Anyfield contains

Add Sub-clause

Add Another Rule

Contains the following math formula (red border means the formula is incomplete)

\[ \int \Omega f(x)dx \]

Only documents with accessible full-text

Search
New bounds for $\Lambda^*_{\omega}$ weights.

Radulescu, Teresa

Volume: 33, Issue: 1, Pages: 111–119
ISBN: 1234-5678

Subjects
- Harmonic analysis in several variables
- Linear function spaces and their duals
- Spaces of inequalities
- Inequalities for sums, norms, and integrals

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  ZMath 12345678
New bounds for $A_\infty$ weights.

Radice, Teresa


Volume: 33, Issue: 1, page 111-119

ISSN: 1239-629X

Access Full Article

*Access to full text*

*Full (PDF)*

Accessible Full-text

*Layered PDF*

*LaTeX*

*XML*

*TXT*

Cite

*MLA*  *BibTeX*  *RIS*


Subjects

- Harmonic analysis in several variables
- Maximal functions
- Lizorkin-Palyuskin theory
- Linear function spaces and their duals
- Spaces of measurable functions and Orlicz spaces
- Köthe function spaces
- Lorentz spaces, rearrangement invariant spaces, ideal spaces, etc.
- Inequalities
- Inequalities for sums, series and integrals

From the Journal


From the Journal

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Articles by Radice

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Displaying similar documents to “New bounds for $A_\infty$ weights.”

**Multidimensional integral inequalities with homogeneous weights.**
Bárány, S., 2005.
General Mathematics
Similarity: [Score]

**On solvability of fourth order operator differential equations of elliptic type on weight spaces.**
Bulletin of TICMI
Similarity: [Score]

**Inversion of incidence mappings.**
Krämer, Heinit (1997)
Séminaire Lotharingien de Combinatoire [electronic only]
Similarity: [Score]

**A new method of solving the basic planar boundary value problems of statics of the elastic mixture theory.**
Georgian Mathematical Journal
Similarity: [Score]

**Liste der Publikationen von Martin Eichler**
(1993)
Acta Arithmetica
Similarity: [Score]

**Binary Moore-Penrose inverses of set inclusion incidence matrices.**
Krämer, Heinit (2001)
Séminaire Lotharingien de Combinatoire [electronic only]
Similarity: [Score]

**Eigenspace decompositions with respect to symmetrized incidence mappings.**
Annotations

- Notes (Comments, Corrections, Explanations, Advice, Examples) can be added to any item and seen on that item’s page.
- URIs and EuDML links are automatically recognised and activated.
- Replies can be added to previous notes to build a conversation.
- Recent notes can be seen from the EuDML home page.
A sidebox on every item’s page expands to allow adding the item to a personal list created on demand or selected from a drop-down list:

User’s set of lists, as well as individual lists, can be viewed and managed:
When an item of interest is found, EuDML provides a sidebox on article pages to make sharing as easy as a single click. Interfaces are provided for:

- **Email** – the message is pre-populated with the item reference
- **Social Networks** – Tweet, Facebook “Like”, or Google “+1” the item
- **Reference Managers** – add the item to Mendeley, CiteULike or BibSonomy
Widgets provide a mechanism to integrate EuDML resources on non-EuDML sites. EuDML provides widgets for:
Search to search EuDML (multiple form factors are provided)
Notes to display comments on particular papers
Lists to display public lists
EuDML provides links to create widgets, and, in the case of Note and List widgets, parameterize them for language and number of entries per page:
Conclusion

- EuDML is a successful pilot project
- Substantial core content
- Wide range of services
- Continuously growing
- Possible basis for a future World Digital Mathematics Library