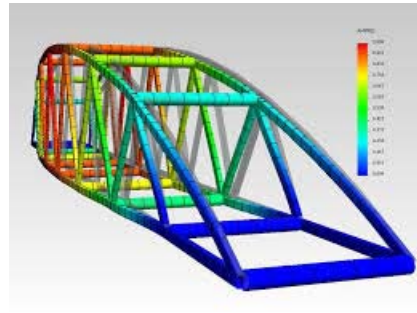
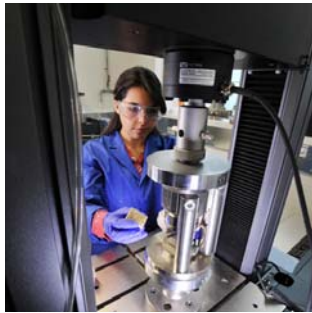


Research Methods in Civil Engineering



Objectives and general presentation of the world of research
Arnaud Deraemaeker (ademaema@ulb.ac.be)



1

Course objectives

Objectives :

- Introduction to the world of research
- Preparation for the master thesis

Main deliverable : 10-12 pages report with:

- A short abstract (½ page)
- An introduction giving the background, context and motivation and general objective of the work (1-2 pages)
- A critical and structured state-of-the-art (2-3 pages)
- A clear and structured work plan (2-3 pages)
- A tentative schedule (1 page)
- A reference list (1-2 pages)

A template is provided (word or latex)

2

Bruface regulations for the master thesis

Every Master's degree requires the fulfillment of a Master's thesis.

The Master's thesis consists of a personal and original manuscript demonstrating a student's ability to identify scientific or technological issues and to mobilize his/her knowledge, skills and competences into a logical and coherent scientific methodology. The Master's thesis may be carried out jointly by two students. In this case, the manuscript and the oral presentation must allow the jury to assess individual contributions.

The Master's thesis must be written in English for the students registered in the full English Master, in Dutch or English for the students registered in the Dutch Master and in French or English for the students registered in the French Master (for exceptional circumstances, refer to point j)).

The length of the main body (without appendices) must be limited to 60 pages per student. Any appendices necessary for a detailed understanding of the content can be added.

3

Bruface regulations for the master thesis

c. Subject, Title and Supervisor

At the latest on Friday of the week following the proclamation of the 1st examination session of the 1st year of the Master's degree, all students must submit to the Faculty Secretariat a form (hard copy), signed by the supervisor, containing the subject, the endorsement of a supervisor, and if relevant, the name of the co-supervisor.

- RMCE is aimed at preparing for the master thesis
- The subject chosen for RMCE can be the one for the master thesis, but it is not compulsory (although strongly advised)

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Course organisation

Six seminars from Feb 14 to March 20 covering the following topics :

- Introduction to research and RMCE objectives
- Extracting and structuring information from a set of references
- Linking the state-of-the-art with the objectives and the methodology
- Building a work-plan and associating a timeline
- Guidelines for writing a clear report (Figures, References, ...)
- Making efficient scientific presentations

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Course organisation

Time line :

- list of master thesis topics available for the students : Feb 7, 2020
- choice of topics by the students : Feb 28, 2020
- draft report submitted to the promotor : April 20, 2020
- evaluation of the report by the promotor : April 30, 2020
- final report : May 29, 2020

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Course organisation

Evaluation :

Course work : 10 % (5% extracting information from a paper,
5% structuring a critical state-of-the-art)

Final report : 90% (50% promotor, 40% external reviewer)

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The world of research



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My research background

Scientific positions :

- Graduated from ULB in 1998 (civil engineering) – Master thesis with UT Austin (Texas)
- First paper published in 1998 (results of master thesis)
- 1998 – 2001 : Phd thesis in Mechanical Engineering (ENS Cachan, France)
- 2001 – 2003 : Post-doctoral researcher at ENS Cachan
- 2003 – 2009 : Post-doctoral researcher at ASL Laboratory (ULB)
- 2009 – 2014 : FNRS permanent researcher at BATir (ULB)
- 2014 – 2020 : Associate Professor at BATir (ULB)

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My research background

Scientific experience :

- Participation to european, national and industrial research projects
- 50 + journal papers in international peer-review journals
- 100 + conference papers in international conferences
- > 3000 citations in 20 years (most cited paper = 500 citations)

Google scholar profile :

<http://scholar.google.com/citations?user=hAIJ1d8AAAAJ&hl=en>

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Scientific contributions

- Conferences :
 - By topic
 - Papers (10-15 pages)
 - Presentations
 - Poster presentations

Hundreds of conferences each year <https://waset.org/civil-engineering-conferences>, all around the world

Example :

<https://www.isma-isaac.be/isma2020/>

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Scientific conferences

The screenshot shows the ISMA website interface. At the top, there is a navigation bar with links: HOME, ISMA2020, USD2020, ISMA45, ISAAC31, PUBLICATIONS, ORGANISERS, LOCATION, CONTACT, PAST EDITIONS, MY ACCOUNT. Below this is a secondary navigation bar with links: Objectives, Abstract Submission, Important dates and registration, Preliminary schedule, ISMA Conference Venue, Scientific committee. The main content area is titled "Abstract submission" and contains the following text: "Potential contributors are requested to submit an abstract (around 400 words) before 15 January, 2020. There is no template provided, the abstract input is done through a text-field in the online submission system (see link below). The scientific committee will decide upon the selection of the papers. If the abstract is selected, the author will be asked to submit a paper (max. 15 pages), suitable for publication in the conference proceedings." Below this text, it says "The online abstract submission is now open!" and there is a blue button labeled "Submit your abstract" with a right-pointing arrow.

- Generally 'soft' reviewing -> quality not ensured
- Often work in progress
- Allows to meet people and build a network of scientific contacts
- It is a business, many poor quality conferences (and related papers)

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Journal papers

- Journal papers :
 - Many journals (by topic)
 - Peer-reviewing process



Home > Journals > Construction and Building Materials

Construction and Building Materials

An international journal dedicated to the investigation and innovative use of materials in construction and repair

Editor-in-Chief: Michael C. Forde
> View Editorial Board

Submit Your Paper

Supports Open Access

View Articles

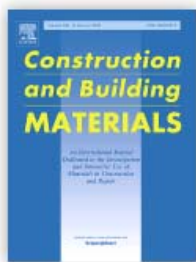
An International journal dedicated to the investigation and innovative use of materials in construction and repair.

Construction and Building Materials provides an international forum for the dissemination of innovative and original research and development in the field of construction and building materials...

Read more

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Journal papers



This journal operates a single blind review process. All contributions will be initially assessed by the editor for suitability for the journal. Papers deemed suitable are then typically sent to a minimum of two independent expert reviewers to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final.

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Journal papers

<https://www.elsevier.com/journals/construction-and-building-materials/0950-0618/guide-for-authors>

Highlights

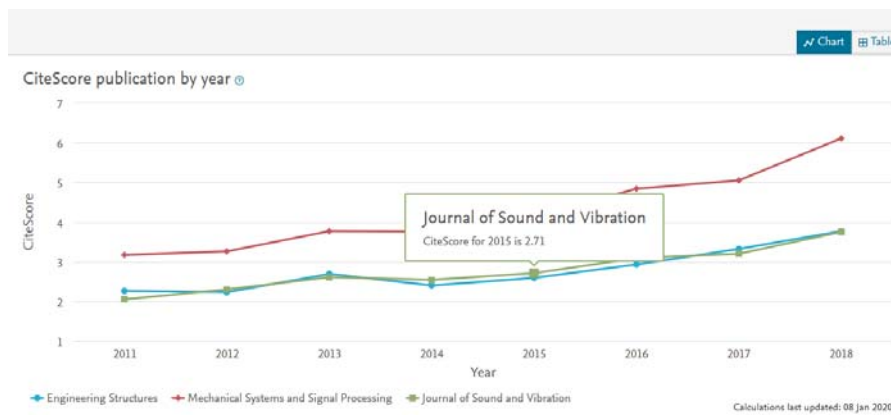
Highlights are mandatory for this journal as they help increase the discoverability of your article via search engines. They consist of a short collection of bullet points that capture the **novel results of your research** as well as **new methods that were used** during the study (if any).

- Peer-reviewing is not a failsafe process.
- Always be critical about what you read and cross-check information with other references.
- Journal publications is a business, not all journals have the same standards and quality

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Journal statistics

www.scopus.com

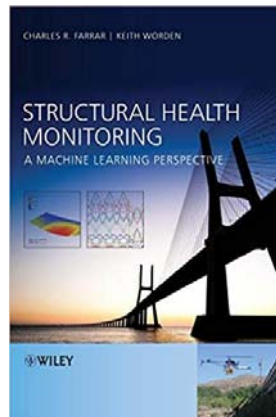


Pay attention : openaccess journals trick the game ...

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Books

- Long manuscripts
- Usually not peer-reviewed (reviewing by editor)
- Collection of chapters from different authors
- Single author



- Found on editor websites
- Or even on amazon
- Quite expensive (150 Eur+)

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Researcher statistics

Google scholar <https://scholar.google.com/citations?user=hAIJ1d8AAAAJ&hl=en>

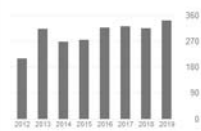


Arnaud Deraemaeker
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 Structural Health Monitoring Damage detection ultrasonics dynamics vibrations

FOLLOWING

Cited by VIEW ALL

	All	Since 2014
Citations	3197	1863
h-index	27	24
i10-index	51	38



Co-authors EDIT

- Pierre Ladevèze
ENS Cachan >
- babuska j >
- Elói Figueiredo
Associate Professor, Universidad... >

TITLE	CITED BY	YEAR
Vibration based structural health monitoring using output-only measurements under changing environment A Deraemaeker, E Reynders, G De Roeck, J Kullaa Mechanical systems and signal processing 22 (1), 34-56	490	2008
Dispersion and pollution of the FEM solution for the Helmholtz equation in one, two and three dimensions A Deraemaeker, I Babuška, P Bouillard International journal for numerical methods in engineering 46 (4), 471-499	359	1999
A six-axis single-stage active vibration isolator based on Stewart platform A Pieumont, M Hroodnicka, J Pironneau, B De Manneffe, M Anraam Journal of sound and vibration 300 (3-5), 644-661	172	2007
Mixing rules for the piezoelectric properties of macro fiber composites A Deraemaeker, H Nasser, A Benjeddou, A Pieumont Journal of intelligent material systems and structures 20 (12), 1475-1492	141	2009
Reduced bases for model updating in structural dynamics based on constitutive relation error A Deraemaeker, P Ladevèze, P Lacotte Computer methods in applied mechanics and engineering 191 (21-22), 2427-2444	106	2002
Vibration based damage detection using large array sensors and spatial filters A Deraemaeker, A Pieumont Mechanical systems and signal processing 20 (7), 1615-1630	100	2006
The damping of a truss structure with a piezoelectric transducer A Pieumont, B De Manneffe, A Deraemaeker, F Bossens Computers & structures 86 (3-6), 227-239	99	2008
Regenerative chatter reduction by active damping control A Ganguli, A Deraemaeker, A Pieumont Journal of sound and vibration 300 (3-5), 847-862	98	2007
Numerical evaluation of the equivalent properties of Macro Fiber Composite (MFC)	86	2010

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Access to publications

Searching for publications :

<https://www.google.com>

(shows citation rate, recent publications, who cited who ...)

Elsevier : <https://www.sciencedirect.com/>

Springer : <https://link.springer.com/>

ULB access :

- Institutional access to elsevier, ...

<https://bib.ulb.be/version-francaise/navigation/trouver-des-documents/periodiques-electroniques>

- Dépôt institutionnel

<https://difusion.ulb.ac.be/>

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Access to publications

The not so fair system of scientific publishing (what there is behind ...)

- Researchers produce journal papers (generally funded by public money)
- Researchers ensure quality of papers (peer-review, generally for free)
- Publishers sell access to the work of researchers to universities (public money)

The alternatives :

- Gold open Access
- Green open Access (embargo period)
- Open Edition
- Illegal servers for « free science » : sci-hub

→ If the paper is not too old, write to the authors to obtain a copy

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The principle of Open Access



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The Gold Open Access model

WILEY

UNDERSTANDING OPEN ACCESS

But this does not solve the problem, a lot of money is still flowing to the private sector

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The Green Open Access model

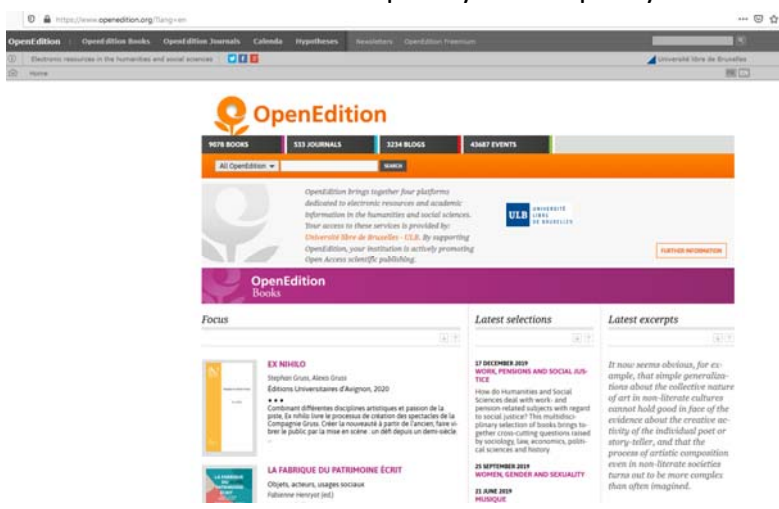


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The Open Edition model

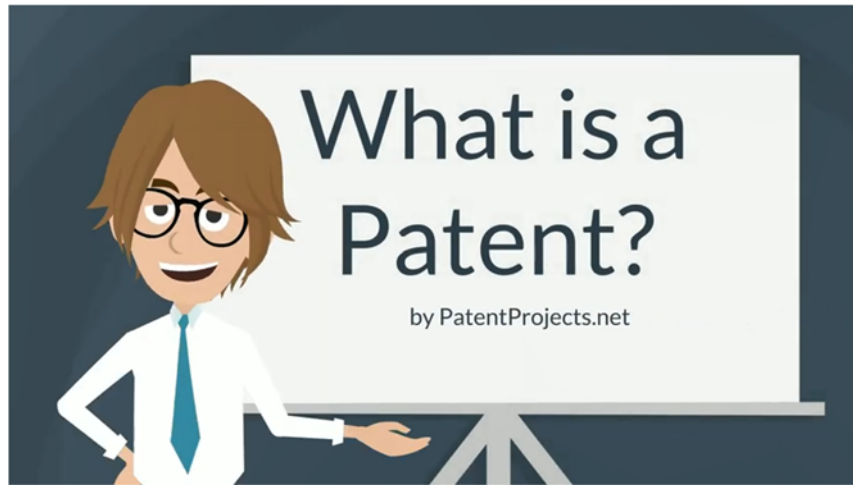
Edition is supported by public sector :

- No more money flowing to private sector
- Less financial issues -> hopefully better quality of science



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The world of patents



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Summary

"Do you feel overwhelmed by the number of research papers in your field? Do you wonder if you're missing key ideas that could be critical for your research program? Does it feel like the deluge is only getting worse?"

You're not imagining things. According to research from the University of Ottawa, in 2009 we [passed the 50 million mark](#) in terms of the total number of science papers published since 1665, and approximately [2.5 million](#) new scientific papers are published each year".

[<http://blog.cdnsiencepub.com/21st-century-science-overload/>]

- • Pay attention to quality, be critical, cross-check results
- Check quality of researcher/journal/conference
- Check the number of citations (taking into account publication year)

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The scientific career

Performing a PhD

- Finding financement
- Performing and defending the research



Following with a Post-Doc

Working in industry

Acquiring an academic
position in a university

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The academic career

The pros :

- Flexible schedule
- Freedom of the research
- World traveling (conf, projects, ...)
- Cooperation with emerging countries
- Stability of position (once tenure track)



The cons

- Takes time to stabilize
- Average salary
- A lot of administration to perform
- Competition to obtain research credits is high

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Chosing a master thesis topic

- Interest for the topic
- Experimental vs numerical work
- Working environment and supervising 'style'
- Opportunities to continue with a PhD

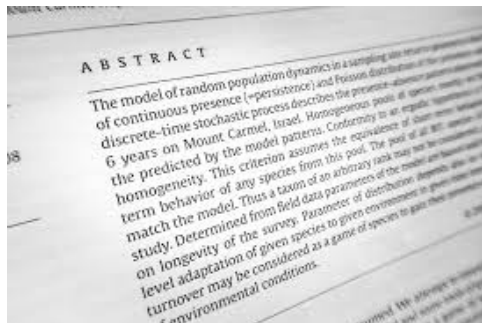


-
- Meet your supervisor
 - Ask questions about supervision scheme, ... and future opportunities

Deadline for chosing a topic is Feb 28, 2020

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Homework 1 : Extracting information from a paper



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Homework 1

Instructions:

Imagine that your research topic is “Optimum design of pendulum tuned mass dampers for applications to high-rise buildings subjected to wind-induced vibrations”.



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Homework 1

Read the paper assigned to you and do your best to answer the following questions:

1) Identify the structure of the paper and extract the type of information that is detailed

What is the structure of the paper? What kind of information is presented? Do the authors use models and if so which types? What are the main hypotheses? Do the authors perform experiments to check their models?

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Homework 1

2) Extract the information that is meaningful for your research project

Does the state-of-the-art refer to papers which might be of interest for a further reading? Can the methods presented in the paper be used in your project?

3) What more do you need to solve your problem?

What type of additional methods would you need? How could you find additional references?

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Homework 1

Homework is due for the RMCE seminar on Feb 28

Example available :

S. M. Avila, M.V.G. de Moraes, M. Barcelos, M.A.M Shzu and R. de C. Silva, "Vibration control of the set tower and wind turbine under the wind influence", Proceedings of COBEM 2009, Gramado, Brasil, Nov 2009.

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