

## **General information**

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Associate Professor

Université Libre de Bruxelles - Building Architecture & Town Planning (BATir)

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## **Academic degrees**

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- November 2008: Thèse d'habilitation à diriger des recherches, "Contributions à la conception de structures intelligentes en dynamique des structures", ENS Cachan, France  
(*in English* : Habilitation to supervise research : Contributions to the design of smart structures in structural dynamics)
- December 2001 : PhD thesis : Sur la maîtrise des modèles en dynamique des structures à partir de résultats d'essais, ENS Cachan, France (supervisor : P. Ladevèze)  
(*in English* : Model quality estimation in structural dynamics )
- July 1998: Masters in civil engineering from Université Libre de Bruxelles (ULB)

## **Scientific career**

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2014-present: Associate Professor, BATir, ULB

2009-2014: FNRS Research associate, BATir, ULB

2008-2009: FNRS research associate, Active Structures Laboratory, ULB

2005-2008: FNRS postdoctoral researcher, Active Structures Laboratory, ULB

2003-2005: SSTC Return grant, postdoctoral researcher, Active Structures Laboratory, ULB

2001-2003: Teaching assistant and researcher at ENS Cachan, France

1998-2001 : PhD student at ENS Cachan, Lab. de Mécanique et de Technologie (LMT), France

## **Research Activities**

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**Main topics of interest** : finite element error estimation, model updating and validation, uncertainties and inverse problems, vibration damping, modelling of piezoelectric structures, model reduction in structural dynamics, structural health monitoring, damage detection, wave propagation in concrete structures, experimental dynamics, embedded piezoelectric transducers for concrete applications, non destructive testing

**Participation to research projects** : 3 European FP6 projects, 1 European FP7 ITN project, 3 European networks, 1 ESF Eurocores project (coordinator), 3 ESA projects, 3 FNRS projects, 1 FNR-Luxembourg Project, 2 industrial projects, 1 LAUNCH Innoviris project, 1 EOS project

**Publications** : 1 book (as editor), 6 chapters of a book, 46 journal papers (international), 98 conference proceedings, 10 invited seminars.

**Statistics** : h-index: 23, i10-index:40, total number of citations: 2501, highest citation for a paper: 382, average number of citations per year since 2013: ~300 (from google scholar)

**Reviewer for international journals :**

Acta Acustica, Acta Mechanica Solida Sinica, AIAA Journal of Guidance, Control and Dynamics, ASME Journal of Vibration and Acoustics, Computers and Structures, Engineering Structures, Experimental mechanics, Experimental Techniques, Journal of Sound and Vibration, Journal of Vibration and Control, Mechanical Systems and Signal Processing, Mechanics of Advanced Materials and Structures, Smart Structures and Systems, Smart materials and Structures, Strain, Structural Control and Health Monitoring, Structural Health Monitoring, Shock and Vibration.

**Funding Id and supervision**

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*Research funding obtained as promotor :*

- \***2018-2020 : Innoviris- LAUNCH (Spin-off) :** Tweetcon : 300 000 Eur (1 post-doc + functioning costs + equipment)
- \***2013 : Fonds David et Alice Van Buuren :** 3 000 Eur (Equipment)
- \***2012-2016 : CRPHT-Luxembourg :** Shape Optimal Design of Piezoelectric Transducers based on advanced modelling for Adaptive Structure Applications (subcontractor) : 35 000 Eur (Subcontracting)
- \***2012 : SDT International :** Design of piezoelectric transducers for ultrasonic monitoring applications : 63 250 Eur (Industrial project)
- \***2011-2013 : FNRS-MIS (Scientific Impulse mandate) :** Dynamic Strain Sensing for SHM: 450 000 Eur (Two post-doctoral fellows + equipment)
- \***2011 : ULB-FER :** Mechanical behavior and evaluation of damage in civil engineering structures : 75 000 Eur (Equipment)
- \***2010 : Fonds David et Alice Van Buuren :** 10 000 Eur (Equipment)
- \***2010 : Partnership Program in Science :** WBI-British Council : *Retinomorphic sensor networks for vibration based structural health monitoring* 3200 Eur (Travel)

*Research funding obtained as co-supervisor :*

- \***2018-2023 : FNRS-EOS :** INTERdisciplinary multiscale Assessment of a new generation of Concrete with alkali activated maTerials (INTERACT) (S. Staquet and A. Deraemaeker)
- \***2013-2015 : FNRS-PDR :** The Nonlinear Tuned Vibration Absorber (G. Kerschen and A. Deraemaeker) : 160 520 Eur
- \***2011-2013 : FNRS-FRFC :** ECOBES (S. Staquet and A. Deraemaeker) : 133 000 Eur (Equipment)
- \***2006-2009 : ESF-EURCORES-S3T :** S3HM (Smart sensing for Structural Health Monitoring) : 40 000 Eur (Equipment)

*PhD grants obtained as supervisor :*

- \***2009-2013 : FRIA-GRANT :** G. Tondreau : localisation in civil engineering structures using dynamic strain measurements
- \***2012-2016 : FNRS-GRANT :** C. Dumoulin : In situ monitoring of concrete behaviour based on embedded piezoelectric transducers

*PhD (co-)supervision*

**Co-supervision of PhD thesis (Ecole Normale Supérieure de Cachan, Laboratory of Mechanics and Technology: 2001-2003)**

-Sébastien Le Loch : Modélisation de l'amortissement dans les structures spatiales.  
Supervisor: P. Ladevèze

-Guillaume Puel : Modélisation et identification des non-linéarités locales en dynamique des structures, théorie des méconnaissances. Supervisor: P. Ladevèze  
-Olivier Dorival : Modélisation et identification des liaisons en vibrations dans le domaine des moyennes fréquences. Supervisor: O. Allix

**Co-supervision of PhD thesis (Université Libre de Bruxelles, Active Structures Laboratory)**

-A. Ganguli : Machine chatter instability in machine tools. Supervisor: A. Preumont, 2005  
-B. de Marneffe : Piezoelectric structures : active, semi-active damping. Supervisor : A. Preumont, 2007

**Supervision of PhD thesis (Université Libre de Bruxelles, BATir)**

-G. Tondreau : Damage localisation in civil engineering structures using dynamic strain measurements, (Defended April 26, 2013). Supervisor : A. Deraemaeker  
- S. Porn : A parametric level set method for the design of distributed piezoelectric modal sensors (Defended April 20, 2016). Supervisors: A.Deraemaeker and H. Nasser  
-C. Dumoulin: In situ monitoring of concrete behaviour based on embedded piezoelectric transducers. Supervisors : A. Deraemaeker and S. Staquet. (Defended May, 2017). Supervisors: A. Deraemaeker and S. Staquet

*Post-Doc supervision*

\*2008-2009: H. Nasser (ULB-ASL) : Homogenisation of piezocomposite transducers  
\*2011-2013: M. Brehm (ULB-BATir) : Numerical modeling of the dynamic response of cracked concrete structures  
\*2011-2013: G. Karaiskos (ULB-BATir): Damage localization in concrete structures using advanced sensor technologies  
\*2013: P. Soltani (ULB-BATir): Design and characterization of a new generation of acoustic emission sensors  
\*2013-2014: G. Tondreau (ULB-BATir) : The non-linear tuned vibration absorber

**Research visits**

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**1997 (august – décembre):** exchange with the University of Austin, Texas, USA (Prof I. Babuska)  
**1998 (august):** research stay at the University of Austin, Texas (I. Babuska)  
**2001 (march):** University of Liverpool (J. Mottershead, COST F3 European grant)  
**1998-2003:** PhD and Post-doctoral stay at ENS Cachan, Paris, France  
**2010-2011:** Four research stays of 3 days at the University of Sheffield, UK.  
**2011 (September):** 3 days at Los Alamos National Laboratories (Dr Ch. Farrar)  
**2011 (September):** 1 day at the University of Houston, Texas (Prof G. Song)  
**2013 (January):** 1 day at the University of Houston, Texas (Prof G. Song)  
**2013 (January):** 4 days at the University Nebraska, Lincoln, USA (Prof J. Turner)  
**2013 (January):** 3 days at Los Alamos National Laboratories, USA (Dr Ch. Farrar)

**Invited talks and seminars**

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- A. Deraemaeker. Monitoring of early age concrete properties and cracking in concrete using embedded piezoelectric transducers. Pierson Graduate Seminar, University of Lincoln, Nebraska, Jan 2013
- A. Deraemaeker. Surveillance vibratoire de l'état de santé de structures à partir de grands réseaux de capteurs. *Séminaire Lamcos*, INSA-Lyon, France, Nov 2011.
- A. Deraemaeker. Research activities in the field of SHM and piezoelectric structures at ULB. *Internal seminar*, Los Alamos National Labs, New Mexico, USA, Sept 2011.
- A. Deraemaeker. Smart aggregates for the estimation of early age concrete properties : early results. *Internal seminar*, University of Houston, Texas, USA, Sept 2011.
- A. Deraemaeker. Filtrage spatial pour la détection et la localisation de défauts dans les structures à partir de mesures vibratoires. In *Séminaire FEMTO-ST*, Université de Franche Comté, Besançon, France, May 2011.
- A. Deraemaeker. Modélisation des structures piézoélectriques: transducteurs composites et calcul des forces équivalentes pour des patches de forme quelconque. In *Séminaire CNAM*, Paris, France, Jan 2010.
- A. Deraemaeker. Smart sensors and sensor networks for vibration based SHM. *University of Sheffield, Deptmt of Mechanical Engineering Seminar*, Sheffield, UK, Nov 2009.
- A. Deraemaeker. Model reduction for coupled electro-acousto-mechanical systems and parametrized systems. In *Workshop on model reduction and control*, Keizerslautern, Germany, May 2007.
- A. Deraemaeker. Structures intelligentes : contrôle actif et contrôle santé en dynamique des structures. *Séminaire du LMT Cachan*, Paris, France, April 2006.
- A. Deraemaeker. Vers uneméthode de validation et de recalage robuste en dynamique des structures. *Journée d'étude F2AS : Recalage Calculs/Mesures*, Paris, France, March 2003.

## **Dissemination activities**

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### **Member of the editorial board:**

(2007-2013) *Advances in Acoustics and Vibration* (Hindawi open access journal)

(2017-present): *Mechanical Systems and Signal Processing* (Elsevier)

### **Missions of expert or consultant**

\*expert for the evaluation of research proposals in France (ANR, INSA Lyon, ENS Cachan)

\*expert for the evaluation of FNRS grants and proposal (SEN-3 commission 2011)

\*expert for the European Commission on the FP7 (Cleansky 2010 – SME 2011, 2012)

\*expert for the University of Luxembourg (2012)

\*Jury McKinsey price (2011), Karlson price (2012) (Belgium, FNRS)

### **Member of PhD Jurys and evaluations abroad :**

-S. Gorbel: *Couplage électromécanique effectif dans les structures piézoélectriques : expérimentations, simulations et corrélations*, Supmeca, Paris, 2009 (rapporteur)

-C. Florens: *Modeling of the viscoelastic honeycomb panel equipped with piezoelectric patches in view of vibroacoustic active control design*, Ecole Centrale de Paris, 2009 (rapporteur)

-J. Waeys: *Contrôle des calculs en dynamique : bornes strictes et pertinentes sur une quantité d'intérêt*, ENS de Cachan, 2010 (rapporteur)

-M. Xiao: *Optimisation multidisciplinaire avec modèles réduits et calculs parallèles*, UTC Compiègne, 2010 (rapporteur)

-M. De Stefano: *Application of optimisation techniques to the diagnostic of aerospace structures*, Politecnico di Torino, 2011 (external rapporteur)

- A. Clément: *Détection de nouveauté pour le monitoring vibratoire des structures de génie civil : approches chaotique et statistique de l'extraction d'indicateurs*, INSA Toulouse, 2011 (rapporteur)
- P.E. Charbonnel: *Validation/recalage de modèles de lanceur à partir de mesures in situ*, ENS Cachan, 2012 (rapporteur)
- G. Ham: *Etude de méthodologies expérimentales pour la modélisation robuste d'aubes en matériau composite tissé*, Univ Franche Comté, France, 2013 (rapporteur)
- A. Buttafuoco : *Design and Control of a Teleoperated Palpation Device for Minimally Invasive Thoracic Surgery*, ULB, 2013
- J. Lebon : *Towards multifidelity uncertainty quantification for multiobjective structural design*, ULB, 2013
- F. Chauvicourt : *Vibro-acoustics of rotating electric machines : prediction, validation and solution*, ULB-KULeuven, 2018.

**Member of scientific committees:**

- International Conference on Smart Materials and Adaptive Structures: Mathematical Modelling and Computation, 14-16 April, 2008, Tangier, Morocco
- 6th International Conference on Manufacturing Systems, october 20-21, Iasi, Romania, 2011
- 1<sup>st</sup> Euro-Mediterranean Conference on Structural Dynamics and Vibroacoustics (Medyna 2013)
- 2<sup>nd</sup> International Conference on Structural Non Linear Dynamics, Agadir, Morocco, May 2014
- 2nd Euro-Mediterranean Conference on Structural Dynamics and Vibroacoustics (Medyna), Sevilla, Spain, April 2017

**Organisation of courses and special sessions in conferences:**

- CISM course “New trends in Vibration Based Structural Health Monitoring”, Udine, Italy, September 2008.
- Forum Acusticum 2005 : Active Vibration Control
- Eurodyn 2011, Mini-symposium : Experimental Techniques
- Eurodyn 2013, Mini-symposium : Experimental techniques and smart structures (incl. non-contact measurements)

**Collaborations**

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**Current academic collaborations outside ULB:**

- Prof K. Worden (Univ. Sheffield, UK)
- Dr. Ch. Farrar (Los Alamos Nat Lab, USA)
- Prof G. Kerschen (Univ of Liège, S3L Laboratory)
- Prof J. Kullaa (Helsinki University of Technology, Finland)
- Prof E. Balmès (ENSAM Paris, France)
- Prof F. Calderon (CeReDeTec, Argentina)

**Past collaborations with industry:**

- Jean-Yves Sener, MS3, Belgium
- Thierry Saive, SDT International, Belgium

**Past scientific collaborations:**

- Prof W. Desmet (KUL, PMA Dpt)
- Dr. H. Van der Auweraer and Dr. B. Peeters (LMS Int)
- SISTHEM team (M. Basseville, L. Mevel, INRIA / IRISA, France)
- Prof A. Benjeddou (Supmeca, France)
- Prof G. De Roeck (KULeuven, Civil Engineering Dpt)
- Prof E. Figuereido, Catholic University of Portugal

### **Prices and awards**

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- Prix Vandenneuvel (1998)
- Solvay Award (1999)
- Prix A.Ir.Br (1999)
- Member of the “Collège des Alumni” of the Belgian Royal Academy of Sciences (2008)
- Honorary FNRS Research Associate (2014)

### **Current Teaching Activities**

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Master 1 Bruface program : Dynamics of Structures / Vibrations and Acoustics