

Cédric Dumoulin

Master of Civil Engineering
Post-Doctoral Researcher

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Research Interests

Damage Detection in Concrete Structures: Investigating the impact of damage on ultrasonic wave propagation, especially using embedded piezoelectric transducers. Developing experimental techniques to detect and localize damage in concrete structures. By extension, studying wave (elastic/nonlinear) propagation in scattering media.

Modeling of Piezoelectric Materials: Finite Element Modeling and Analytic Modeling of Piezoelectric Transducers. Developing and optimizing embedded piezoelectric transducers.

Dynamics of Structures: Finite Element Model Reduction, Component Mode Synthesis, in particular in the framework of optimisation of TMD and Active Vibration Isolation

Active Seismic Isolation.

Professional Experience

jan. 2020 - Present **Post-Doctoral Researcher**, *Université libre de Bruxelles (ULB)*, Precision Mechanics Lab. PML (Beams), Funded by the Belgian National Fund for Scientific Research F.R.S-FNRS.

Research on Active Seismic Isolation

jan. 2017 - dec. 2019 **Researcher-Entrepreneur, Post-Doctoral Researcher**, *Université libre de Bruxelles (ULB)*, BATir, Funded by Innoviris, the Brussels-Capital Region's funds for R&D.

In charge of the Innoviris Launch Spin-Off Project "TweetCon"

2012 - 2017 **Research Fellow, PhD Candidate**, *Université libre de Bruxelles (ULB)*, BATir Department, Funded by the Belgian National Fund for Scientific Research F.R.S-FNRS.

In Situ Monitoring of Concrete Behavior Based On Embedded Piezoelectric Transducers

Teaching Activities, *Université libre de Bruxelles (ULB)*.

Dynamics of Structures (theoretical lectures and exercises), Structural Analysis (exercises)

Education

2012 **Master of Civil Engineering**, *Université libre de Bruxelles (ULB)*, École polytechnique de Bruxelles, *with highest honors*.

Master Thesis: *Concrete Damage Monitoring Using Embedded Piezoelectric Transducers*

2010 **Bachelors of Civil Engineering**, *Université libre de Bruxelles (ULB)*, École polytechnique de Bruxelles, *with honors*.

Publications

Books Chapters

Dumoulin, Cédric, Karaiskos, Grigorios, and Deraemaeker, Arnaud (2015a). "Concrete Monitoring Using Embedded Piezoelectric Transducers". In: Springer Berlin Heidelberg, pp. 1–12. DOI: 10.1007/978-3-642-36197-5_94-1. URL: <http://hdl.handle.net/2013/ULB-DIPOT:oai:dipot.ulb.ac.be:2013/200674>.

Dumoulin, Cédric, Karaiskos, Grigorios, and Deraemaeker, Arnaud (2015b). "Monitoring of crack propagation in reinforced concrete beams using embedded piezoelectric transducers". In: Woodhead Publishing Series in Civil and Structural Engineering. Woodhead Publishing, pp. 161–175. DOI: 10.1016/B978-1-78242-327-0.00008-8. URL: <http://hdl.handle.net/2013/ULB-DIPOT:oai:dipot.ulb.ac.be:2013/200665>.

Peer Review Articles

Delsaute, Brice, Boulay, Claude, Granja, José, Carette, Jerome, Azenha, Miguel, Dumoulin, Cédric, Karaiskos, Grigorios, Deraemaeker, Arnaud, and Staquet, Stéphanie (2016). "Testing Concrete E-modulus at Very Early Ages Through Several Techniques: An Inter-laboratory Comparison". In: *Strain*. DOI: 10.1111/str.12172. URL: <http://hdl.handle.net/2013/ULB-DIPOT:oai:dipot.ulb.ac.be:2013/225170>.

Dumoulin, Cédric and Deraemaeker, Arnaud (2016b). "Design of embedded ultrasonic transducers for concrete structures assessment". In: *Ultrasonics* In review.

Dumoulin, Cédric, Karaiskos, Grigorios, Sener, Jean-Yves, and Deraemaeker, Arnaud (2014). "Online monitoring of cracking in concrete structures using embedded piezoelectric transducers". In: *Smart materials and structures* 23.11. DOI: 10.1088/0964-1726/23/11/115016. URL: <http://hdl.handle.net/2013/ULB-DIPOT:oai:dipot.ulb.ac.be:2013/176635>.

Dumoulin, Cédric, Karaiskos, Grigorios, Carette, Jerome, Staquet, Stéphanie, and Deraemaeker, Arnaud (2012b). "Monitoring of the ultrasonic P-wave velocity in early-age concrete with embedded piezoelectric transducers". In: *Smart materials and structures* 21. DOI: 10.1088/0964-1726/21/4/047001. URL: <http://hdl.handle.net/2013/ULB-DIPOT:oai:dipot.ulb.ac.be:2013/116963>.

Conference Proceedings

Dumoulin, Cédric and Deraemaeker, Arnaud (2016a). "Design of Embedded Piezoelectric Transducers for Structural Health Monitoring in Concrete Structures". In: *8th European Workshop On Structural Health Monitoring (EWSHM 2016)*. Conference: EWSHM 2016(8: July 5-8, 2016: Bilbao (Spain)). NDT.net, p. 10. URL: <http://hdl.handle.net/2013/ULB-DIPOT:oai:dipot.ulb.ac.be:2013/234379>.

Dumoulin, Cédric and Deraemaeker, Arnaud (2014). "Real-time fast ultrasonic monitoring of cracking in a concrete cylinder subject to compression". In: *9th International Conference on Structural Dynamics, Eurodyn 2014*. Conference: Eurodyn 2014(30 Jun - 2 Jul 2014: Porto, Portugal). URL: <http://hdl.handle.net/2013/ULB-DIPOT:oai:dipot.ulb.ac.be:2013/157128>.

Boulay, Claude, Staquet, Stéphanie, Azenha, Miguel, Deraemaeker, Arnaud, Crespini, Michela, Carette, Jerome, Granja, José, Delsaute, Brice, Dumoulin, Cédric, and Karaiskos, Grigorios (2013). "Monitoring elastic properties of concrete since very early age by means of cyclic loadings, ultrasonic measurements, natural resonant frequency of composite beam (emm-arm) and with Smart Aggregates". In: *Proceedings of 8th International Conference on Fracture Mechanics of Concrete and Concrete Structures*.

Conference: International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCoS-8) (8th: 10th - 14th March 2013: Toledo, Spain). URL: <http://hdl.handle.net/2013/ULB-DIPOT:oai:dipot.ulb.ac.be:2013/133904>.

Dumoulin, Cédric, Karaiskos, Grigorios, and Deraemaeker, Arnaud (2013). "Monitoring of crack propagation in reinforced concrete beams using embedded piezoelectric transducers". In: *Proceedings of 8th International Conference on Fracture Mechanics of Concrete and Concrete Structures*. Conference: 8th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCoS-8) (8th: 10th - 14th March 2013: Toledo, Spain). URL: <http://hdl.handle.net/2013/ULB-DIPOT:oai:dipot.ulb.ac.be:2013/153414>.

Carette, Jerome, Dumoulin, Cédric, Karaiskos, Grigorios, Staquet, Stéphanie, and Deraemaeker, Arnaud (2012). "Monitoring of the E-modulus in early age concrete since setting time with embedded piezoelectric transducers". In: *Proceedings of Structural Faults + Repair, 14th International Conference and Exhibition*. Conference: Structural Faults + Repair, International Conference and Exhibition(14th: 3rd - 5th July 2012: Edinburg, Scotland, UK). URL: <http://hdl.handle.net/2013/ULB-DIPOT:oai:dipot.ulb.ac.be:2013/116965>.

Dumoulin, Cédric, Karaiskos, Grigorios, Carette, Jerome, Staquet, Stéphanie, and Deraemaeker, Arnaud (2012a). "Monitoring of the ultrasonic P-wave velocity in early-age concrete using Smart Aggregates". In: *MATEC Web of Conferences*. Conference: International Conference on Structural Nonlinear Dynamics and Diagnosis (CSNDD 2012)(30th April - 2nd May 2012: Marrakech, Maroc), 01001 (3). DOI: 10.1051/mateconf/20120101001. URL: <http://hdl.handle.net/2013/ULB-DIPOT:oai:dipot.ulb.ac.be:2013/116966>.

Honors and Awards

- 2012 **Prix Francis Vandenheuvel**, *Foundation Francis Vandenheuvel*.
- 2012 **Prix André Paduart**, *Université Libre de Bruxelles*.
- 2012 **Prix Spécial Anixton**, *Université Libre de Bruxelles*.
- 2012 **Prix A.Ir.Br**, *Alumni École Polytechnique de Bruxelles*.

Skills

- Computer Matlab, SDT (Structural Dynamic Toolbox), LabVIEW, \LaTeX , C, C++.
- Language French (native), English (good command), Dutch (basic command).
- Laboratory Instrumentation development, Ultrasonic Wave Propagation, Concrete Destructive Testing.

Other Experiences

- 2015 - 2016 **Responsible for a Youth Movement Unit**, *Les Scouts*, Brussels.
Approximately 350 Childrens and 60 Leaders
- 2007 - 2014 **Youth Movement Leader**, *Les Scouts*, Brussels.
- 2005 - 2007 **Manager of a Fair-trade Store (Oxfam) at School**.