

# Nicolas Bochud

Associate Professor at Université Paris-Est Créteil

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Swiss nationality

## Education

- 2010 – 2014 **PhD in Civil Engineering and Architecture**, *Ultrasonics Lab*, Department of Structural Mechanics and Hydraulic Engineering, University of Granada, Spain.  
PhD thesis: “Signal processing-based identification of pathology using ultrasonics” ,  
Supervisors: Guillermo Rus Carlborg and Ángel M. Gómez García. Date of defense: 24/02/2014
- 2009 – 2010 **MSc in Information Technology**, *SigMAT*, Department of Signal Theory, Telematics and Communications, University of Granada, Spain.  
MSc thesis: “Signal processing methods for nondestructive evaluation using ultrasonics” ,  
Supervisor: Antonio M. Peinado Herreros
- 2006 – 2008 **MSc in Mechanical Engineering**, *Institute for Mechanical Systems*, Department of Mechanical and Process Engineering, ETH Zurich, Switzerland.  
Semester thesis: “Dispersion of axialsymmetric waves in radially graded and layered cylindrical structures” ,  
MSc thesis: “Investigations of the wave propagation in tip-like structures” ,  
Supervisors: Jürg Bryner, Jacqueline Vollmann and Jürg Dual
- 2002 – 2006 **BSc in Mechanical Engineering**, *Institute of Design, Materials and Fabrication*, Department of Mechanical and Process Engineering, ETH Zurich, Switzerland.  
BSc thesis: “Analysis of beam elements for compliant structures”,  
Supervisors: Michael Sauter, Gerald Kress and Paolo Ermanni

## Employment history

- 2018 – ... **Associate Professor**, *Multiscale Simulation and Modeling laboratory*, Biomechanics team, MSME, UMR 8208 CNRS, Université Paris-Est Créteil.  
Research topic: “Ultrasound characterization of biomaterials and bioinspired materials”
- 2017 – 2018 **SNSF Advanced PostDoc Mobility Fellow**, *Institut Langevin*, ESPCI, Paris.  
12 months Research project: “Inverse characterization of the mechanical coupling in layered media using elastic guided waves”, Supervisor: Claire Prada
- 2016 – 2017 **Postdoctoral researcher**, *Institut Langevin*, ESPCI, Paris.  
12 months Research project: “Non-contact laser ultrasonics methods for the evaluation of adhesion”, Supervisor: Claire Prada
- 2014 – 2016 **Postdoctoral researcher**, *Laboratoire d'Imagerie Biomédicale*, Sorbonne Université, Paris.  
26 months Research project: “Towards the improvement of fracture risk prediction: assessment of the thickness and porosity of the cortical shell using ultrasound guided waves.”, Supervisor: Pascal Laugier
- 2011 **Research stay within the frame of my PhD**, *Laboratoire d'Imagerie Biomédicale*, Sorbonne Université, Paris.  
3 months Research project: “A nonlinear stratified model to predict ultrasonic wave propagation in trabecular bone”, Supervisors: Guillermo Rus and Quentin Grimal
- 2009 **Research assistant**, *Ultrasonics Lab*, Department of Structural Mechanics, University of Granada, Spain.  
4,5 months Research project: “Nonlinear interface damage modeling using ultrasonics”, Supervisor: Guillermo Rus
- 2007 **Research internship**, *Centre for Mechanical Engineering*, University of Coimbra, Portugal.  
3 months Research project: “FEA work concerning the constitutive model selected to describe the mechanical behavior of sheet materials”, Supervisors: Marta C. de Oliveira and Luis F. Menezes

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## Teaching activities

- 2020 – ... **Associate Professor**, *UFR Sciences et Technologie*, Université Paris-Est Créteil.  
192 hours/y Course units: General Mechanics (L2), Metrology (L2), Continuum Mechanics (L3), Numerical Methods in Mechanics (L3), Elasticity (M1)
- 2018 – 2020 **Associate Professor**, *UFR Sciences et Technologie*, Université Paris-Est Créteil.  
152 hours/y Course units: General Mechanics (L2), Continuum Mechanics (L3), Numerical Methods and Programming (M1), Mechanics of Deformable Solids (L3)
- 2010 – 2013 **Teaching assistant**, *Department of Structural Mechanics and Hydraulic Engineering*, University of Granada, Spain.  
64 hours/y Course units: Structural Analysis (L3), Dynamics (M1), Continuum Mechanics (L3), Introduction to Composite Materials (workshop), Introduction to Research (workshop)
- 2006 – 2008 **Teaching assistant**, *Department of Mechanical and Process Engineering*, ETH Zurich, Switzerland.  
30 hours/y Yearly one-week course: *Engineering Tool: Computer-based Mathematics*,  
Head lecturers: Stefan Kaufmann and Jürg Dual

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## Supervision and and co-supervision of junior researchers

- 2022 **Houssam Yahiaoui**, *Multiscale Simulation and Modeling laboratory*, Université Paris-Est Créteil.  
6 months MSc thesis: “Modeling the wave propagation in heterogeneous media within the frame of surface elasticity” (started in April 2022)
- 2022 **Hugo de Oliveira**, *Multiscale Simulation and Modeling laboratory*, Université Paris-Est Créteil.  
2 months BSc thesis: “Impact of uncertainties on the propagation of ultrasonic waves in periodic media achieved by additive manufacturing” (Defense: 04/07/2022)
- 2021 – ... **Max Gattin**, *Multiscale Simulation and Modeling laboratory*, Université Paris-Est Créteil.  
36 months PhD thesis: “Ultrasound characterization of interphases: Application to the tendon-to-bone entheses” (started in October 2021). Main supervisor: Salah Naili
- 2021 **Max Gattin**, *Multiscale Simulation and Modeling laboratory*, Université Paris-Est Créteil.  
6 months MSc thesis: “Ultrasound characterization of 3D-printed architected materials” (Defense: 12/07/2022)
- 2021 **Aden Rana**, *Multiscale Simulation and Modeling laboratory*, Université Paris-Est Créteil.  
2 months BSc thesis: “Tensile testing of materials achieved by additive manufacturing” (Defense: 03/06/2021)
- 2018 – 2021 **Ali Aghaei**, *Multiscale Simulation and Modeling laboratory*, Université Paris-Est Créteil.  
39 months PhD thesis: “Ultrasonic characterization of soft tissue-to-bone interphase: modeling, numerical study and experimental validation” (Defense: 13/12/2021). Main supervisor: Salah Naili
- 2018 **Sean Toffessi**, *Institut Langevin*, ESPCI, PSL Research University, Paris.  
6 months MSc thesis: “Characterization of anisotropic materials by elastic guided waves” (Defense: 18/09/2018)
- 2017 **Mathieu Nicolas**, *Institut Langevin*, ESPCI, PSL Research University, Paris.  
5 months MSc thesis: “A guided waves-based ultrasound scanner for real-time assessment of solid materials” (Defense: 01/09/2017)
- 2014 – 2016 **Quentin Vallet**, *Laboratoire d’Imagerie Biomédicale*, Sorbonne Université, Paris.  
36 months PhD thesis: “Predicting bone strength with ultrasonic guided waves” (Defense: 15/12/2016).  
Main supervisors: Pascal Laugier and Jean-Gabriel Minonzio
- 2016 **Gautier Billaux**, *Laboratoire d’Imagerie Biomédicale*, Sorbonne Université, Paris.  
6 months MSc thesis: “FDTD simulations of the propagation of guided waves in cortical bone for understanding the impact of geometric irregularities on the waveguide” (Defense: 30/08/2016)
- 2016 **Jean-Sébastien Bondet**, *Laboratoire d’Imagerie Biomédicale*, Sorbonne Université, Paris.  
6 months MSc thesis: “Analysis of ex vivo measurements to recover structural and material properties of cortical bone at the tibial site” (Defense: 05/09/2016)

- 2015 **Gabrielle Lahaye**, *Laboratoire d'Imagerie Biomédicale*, Sorbonne Université, Paris.  
2 months BSc thesis: "Reproducibility study of in vivo axial transmission measurements" (Defense: 31/08/2015)
- 2015 **Mathieu Mantelet**, *Laboratoire d'Imagerie Biomédicale*, Sorbonne Université, Paris.  
6 months MSc thesis: "Simulations of the propagation of guided waves in cortical bone" (Defense: 25/06/2015)
- 2014 **Sergio Cantero Chinchilla**, *Ultrasonics Lab*, University of Granada, Spain.  
6 months MSc thesis: "A novel blind parametrization algorithm for damage detection in CFRP plates" (Defense: 24/07/2014)
- 2013 **Juan Jesus Roman Torres**, *Ultrasonics Lab*, University of Granada, Spain.  
6 months MSc thesis: "Evaluation of mechanical properties using an ultrasound-based bioreactor" (Defense: 01/07/2014)

## Organization of conferences

- 2022 **Member of the organizing committee**, *International Research Project Coss&Vita*, Arpino (Italy), 24–27 October 2022.  
'Workshop on metamaterials and biomechanics: from bio-inspiration to bio-metamaterials'
- 2013 **Member of the organizing committee**, *University of Granada*, Spain, 7–10 May 2013.  
'5th European Symposium of Ultrasonic Characterization of Bone'

## Individual scientific reviewing activities

- 2017 **Member of the PhD board committee as an examiner**, *University of Jaen*, Spain.  
Violeta Montiel Zafra: "Development of signal processing methods using ground-penetrating radar to evaluate the quality of stone materials" (Defense: 16/06/2017)
- 2022 **Peer review for the journals**, *Med. Eng. Phys.*, *IEEE Trans. Ultrason. Ferroelectr. Freq. Control*, *J. Funct. Biomater.*, *PlosOne*.
- 2021 **Peer review for the journals**, *Ultrasound Med. Biol.*, *IEEE Trans. Ultrason. Ferroelectr. Freq. Control*, *Sci. Rep.*, *Bone Rep.*, *Ultrasonics*, *Measurement*.
- 2020 **Peer review for the journals**, *Bone Rep.*, *IEEE Trans. Ultrason. Ferroelectr. Freq. Control*, *IEEE Access*.
- 2019 **Peer review for the journals**, *IEEE Access*, *Acta Acust. united Ac.*, *Meas. Sci. Technol.*, *Med. Phys.*, *Appl. Acoust.*, *IEEE Trans. Ultrason. Ferroelectr. Freq. Control*.
- 2018 **Peer review for the journals**, *IEEE Trans. Ultrason. Ferroelectr. Freq. Control*, *J. Acoust. Soc. Am.*, *Smart Mater. Struct.*, *Ultrasonics*, *Sensors*.
- 2017 **Peer review for the journals**, *Physiol. Meas.*, *Acta Acust. united Ac.*, *Comput. Biol. Med.*, *Metals*, *Materials*.
- 2013 – 2016 **Peer review for the journals**, *Multidiscip. Model. Mater. Struct.*, *Ultrasonics*.


## Fundings


- 2022 – 2023 **Coup de pouce 2022**, *PIMM and MSME laboratories*, Ultra-wideband characterization of viscoelastic materials.  
12 months Entity: Fédération Francilienne de Mécanique (amount: 45 000 €)
- 2021 – 2022 **Bonus Qualité Recherche – young researchers**, *MSME laboratory*, Ultrasound characterization of bioinspired functionally graded hierarchical soft-to-hard composites.  
12 months Entity: Université Paris-Est Créteil (amount: 3 700 €)
- 2019 – 2020 **Engineering Inspired by Nature**, *MSME laboratory*, BEST–AMUS.  
12 months Entity: CNRS–INSIS (amount: 15 000 €)








- 2019 – 2020 **Support for research for recently hired Associate Professors, MSME laboratory**, 12 months  
Ultrasound characterization of biomimicking enthesis substitutes achieved through additive manufacturing.  
Entity: Faculté des Sciences et Technologie, UPEC (amount: 2 710 €)
- 2019 – 2020 **Bonus Qualité Recherche, MSME laboratory**, 12 months  
Understanding the interactions between ultrasound waves and bioinspired interphases achieved through additive manufacturing.  
Entity: Université Paris-Est Créteil (amount: 1 500 €)
- 2018 – 2019 **Support for research for recently hired Associate Professors, MSME laboratory**, 12 months  
Ultrasound characterization of the mechanical properties of the tendon-to-bone interphase.  
Entity: Faculté des Sciences et Technologie, UPEC (amount: 4 800 €)
- 2017 – 2018 **SNSF Advanced PostDoc Mobility fellowship, Institut Langevin**, P300P2–174481. 12 months  
Entity: Swiss National Science Foundation (amount: 50 000 CHF)
- 2014 – 2015 **Postdoctoral fellowship, Ultrasonics Lab**, TIC–3911. 12 months  
Entity: Junta de Andalucía (amount: 43 140 €, renunciation due to another postdoc opportunity)
- 2011 **Fellowship for a short research stay abroad within the frame of my PhD, Laboratoire d'Imagerie Biomédicale, Sorbonne Université**. 3 months  
Entity: Junta de Andalucía (amount: 3 194 €)
- 2009 – 2013 **Doctoral fellowship, Ultrasonics Lab**, P08–TIC–03911. 48 months  
Entity: Junta de Andalucía (amount: 80 000 €)

## Research output list

### Publications in international peer-reviewed scientific journals.

- M. Gattin, [N. Bochud](#), G. Rosi, Q. Grossman, D. Ruffoni, and S. Naili. Ultrasound characterization of the viscoelastic properties of additively manufactured photopolymer materials. *J. Acoust. Soc. Am.*, **2022** (under review).
- A. Aghaei, [N. Bochud](#), G. Rosi, Q. Grossman, D. Ruffoni, and S. Naili. Ultrasound characterization of bioinspired functionally graded soft-to-hard composites: Experiment and modeling. *J. Acoust. Soc. Am.*, 151(3):1490–1501, **2022** .
- M. Thelen\*, [N. Bochud](#)\*, M. Brinker, C. Prada, and P. Huber. Laser-excited elastic guided waves reveal the complex mechanics of nanoporous silicon. *Nat. Commun.*, 12(1):1–10, **2021**  (\*these authors contributed equally).
- A. Aghaei, [N. Bochud](#), G. Rosi, and S. Naili. Wave propagation across a functionally graded interphase between soft and hard solids: Insight from a dynamic surface elasticity model. *J. Mech. Phys. Solids*, 151:104380, **2021** .
- A. Aghaei, [N. Bochud](#), G. Rosi, and S. Naili. Assessing the effective elastic properties of the tendon-to-bone insertion: a multiscale modeling approach. *Biomech. Model Mechanobiol.*, 20(2):433–448, **2021** .
- J.-G. Minonzio, [N. Bochud](#), Q. Vallet, D. Ramiandrisoa, A. Etcheto, K. Briot, S. Kolta, C. Roux, and P. Laugier, Ultrasound-based estimates of cortical bone thickness and porosity are associated with non-traumatic fractures in postmenopausal women: A pilot study. *J. Bone Miner. Res.*, **2019** .
- J. Melchor, W. J. Parnell, [N. Bochud](#), L. Peralta, and G. Rus, Damage prediction via nonlinear ultrasound: A micro-mechanical approach. *Ultrasonics*, 93:145–155, **2019** .
- J.-G. Minonzio, [N. Bochud](#), Q. Vallet, Y. Bala, D. Ramiandrisoa, H. Follet, D. Mitton, and P. Laugier, Bone cortical thickness and porosity assessment using ultrasound guided waves: An ex vivo validation study. *Bone*, 116:111–119, **2018** .
- [N. Bochud](#), J. Laurent, F. Bruno, D. Royer and C. Prada, Towards real-time assessment of anisotropic plate properties using elastic guided waves. *J. Acoust. Soc. Am.*, 143(2):1138–1147, **2018** .
- [N. Bochud](#), Q. Vallet, J.-G. Minonzio, and P. Laugier, Predicting bone strength with ultrasonic guided waves. *Sic. Rep.*, 7:43628, **2017** .
- J. Chiachío, [N. Bochud](#), M. Chiachío, S. Cantero, and G. Rus, A multilevel Bayesian method for

ultrasoundbased damage identification in composite laminates. *Mech. Syst. Signal Process.*, 88:462—477, **2017** .

- N. Bochud, Q. Vallet, Y. Bala, H. Follet, J.-G. Minonzio, and P. Laugier, Genetic algorithms-based inversion of multimode guided waves for cortical bone characterization. *Phys. Med. Biol.*, 61:6953–6974, **2016** .
- Q. Vallet, N. Bochud, C. Chappard, J.-G. Minonzio, and P. Laugier, In vivo characterization of cortical bone using guided waves measured by axial transmission. *IEEE Trans. Ultrason. Ferroelectr. Freq. Control*, 63(9):1361–1371, **2016** .
- N. Bochud, A. Gomez, G. Rus, and A. Peinado, A sparse digital signal model for ultrasonic nondestructive evaluation of multilayered materials. *Ultrasonics*, 62:160–173, **2015** .
- L. Peralta, G. Rus, N. Bochud, and F. S. Molina, Mechanical assessment of cervical remodelling in pregnancy: Insight from a synthetic model. *J. Biomech.*, 48(9):1557–1565, **2015** .
- L. Peralta, G. Rus, N. Bochud, and F. S. Molina, Assessing viscoelasticity of shear wave propagation in cervical tissue by multiscale computational simulation. *J. Biomech.*, 48(9):1549–1556, **2015** .
- A. A. Fahim, R. Gallego, N. Bochud, and G. Rus, Model-based damage reconstruction in composites from ultrasound transmission. *Compos. Part B-Eng.*, 45(1):50–62, **2013** .
- N. Bochud and G. Rus, Probabilistic inverse problem to characterize tissue-equivalent material mechanical properties. *IEEE Trans. Ultrason. Ferroelectr. Freq. Control*, 59(7):1443–1456, **2012** .



#### Publications in peer-reviewed conference proceedings.

- A. Aghaei, N. Bochud, G. Rosi, Q. Grossman, D. Ruffoni, and S. Naili. Characterization of the mechanical properties of enthesis-mimicking samples using elastic waves, *27th International Congress on Sound and Vibration*, 11–16 July, Praga, **2021** .
- A. Aghaei, N. Bochud, G. Rosi, Q. Grossman, D. Ruffoni, and S. Naili. Wave propagation across the tendon-to-bone interphase modeled as an equivalent interface with specific surface properties, *Forum Acusticum*, 20–24 April, Lyon, **2020** .
- M. Thelen, N. Bochud, M. Brinker, C. Prada, and P. Huber. Mechanical characterization of nanoporous silicon using elastic guided waves, *Forum Acusticum*, 20–24 April, Lyon, **2020** .
- J.-G. Minonzio, E. Zapata, N. Bochud, Q. Vallet, F. Rongieras, J.-B. Pialat, H. Follet, and D. Mitton. Ex vivo radius fracture discrimination from cortical thickness and porosity obtained by axial transmission. *IEEE Int. Ultrason. Symp.*, p. 1–4, Kobe, October **2018** .
- L. Bai, K. Xu, N. Bochud, D. Ta, B. Hu, P. Laugier, J.-G. Minonzio. Multichannel wideband mode-selective excitation of ultrasonic guided waves in long cortical bone. *IEEE Int. Ultrason. Symp.*, p. 1–4, Tours, September **2016** .
- J.-G. Minonzio, Q. Vallet, N. Bochud, Q. Grimal, and P. Laugier. Advances in cortical bone assessment using ultrasonic resonances and guided waves. *International Congress on Acoustics*, p. 1–9, Buenos Aires, September **2016** .
- A. Rodriguez, A. M. Gomez, N. Bochud, J. M. Soto, and A. M. Peinado. A clustering-based damage segmentation for ultrasonic C-scans of CFRP plates. *IEEE Int. Ultrason. Symp.*, p. 1–4, Taipei, October **2015** .
- J. M. Soto, A. M. Peinado, A. M. Gomez and N. Bochud. Feature extraction for robust impact damage classification of CFRP plates. *IEEE Int. Ultrason. Symp.*, p. 1–4, Taipei, October **2015** .
- G. Renaud, J.-G. Minonzio, Q. Vallet, N. Bochud, S. Bernard, M. Talmant, Q. Grimal, and P. Laugier. Quantitative ultrasound yields biomarkers of bone mechanical competence. *22<sup>me</sup> Congrès Français de Mécanique*, p. 1–6, Lyon, August **2015** .
- N. Bochud, J.-G. Minonzio, Q. Vallet, and P. Laugier. A genetic algorithms-based optimization method for estimating thickness and porosity of cortical bone from guided wave measurements. *6<sup>th</sup> European Symposium on Ultrasonic Characterization of Bone*, p. 1–4, Corfu, June **2015** .
- N. Bochud, J.-G. Minonzio, Q. Vallet, and P. Laugier. An anisotropic bilayer model to gain insight into



- in vivo guided wave measurements. *6<sup>th</sup> European Symposium on Ultrasonic Characterization of Bone*, p. 1–4, Corfu, June **2015** .
- J.-G. Minonzio, Q. Vallet, N. Bochud, A. Etcheto, K. Briot, S. Kolta, C. Roux, and P. Laugier. Discrimination of fractured from non-fractured post-menopausal women using guided wave-based ultrasound: A pilot clinical study. *6<sup>th</sup> European Symposium on Ultrasonic Characterization of Bone*, p. 1–4, Corfu, June **2015** .
  - R. Muñoz, N. Bochud, G. Rus, L. Peralta, J. Melchor, J. Chiachío, M. Chiachío, and L. J. Bond. Model-based damage evaluation of layered CFRP structures. *41<sup>st</sup> Annual Review of Progress in Quantitative Nondestructive Evaluation*, p. 1170–1177, Boise, July **2014** .
  - G. Rus, N. Bochud, J. Melchor, L. Peralta, J. Chiachio, M. Chiachio, A. Gómez, and J. A. Marchal. Ultrasonic monitoring of artificial tissue mechanical properties in biorreactor. *2<sup>nd</sup> International Work-Conference on Bioinformatics and Biomedical Engineering*, p. 77–83, Granada, April **2014** .
  - L. Peralta, G. Rus, N. Bochud, J. Melchor, J. Chiachio, and M. Chiachio. Model-based probability of detection of pathologies in soft tissue. *2<sup>nd</sup> International Work-Conference on Bioinformatics and Biomedical Engineering*, p. 85–96, Granada, April **2014** .
  - J. Melchor, G. Rus, N. Bochud, L. Peralta, J. Chiachio, and M. Chiachio. Model-based probability of detection of pathologies in soft tissue. *2<sup>nd</sup> International Work-Conference on Bioinformatics and Biomedical Engineering*, p. 97–107, Granada, April **2014** .
  - N. Bochud, A. Gomez, G. Rus, and A. Peinado. Sparse signal model for ultrasonic nondestructive evaluation of CFRP composite plates. *IEEE Int. Conf. Acoust. Speech Signal Process.*, p. 2844–2847, Vancouver, May **2013** .
  - G. Rus, N. Bochud, J. Melchor, L. Peralta, J. Chiachio, M. Chiachio, A. J. Gomez, A. C. Ximenez, M. Alaminos, and A. Campos. In-biorreactor ultrasonic monitoring of tissue mechanical properties. *International Congress on Ultrasonics*, p. 657–661, Singapore, May **2013** .
  - A. J. Gómez, G. Rus, F. J. Suárez, D. Arcoya, N. Bochud, J. Melchor, L. Peralta, J. Chiachío, and M. Chiachío. Biomechanical shear moduli recovery from ultrasound in multilayered half-space media. *International Congress on Ultrasonics*, p. 657–661, Singapore, May **2013** .
  - B. Fuentes, J. L. Carmona, N. Bochud, A. Gomez, and A. Peinado. Model-based cepstral analysis for ultrasonic non-destructive evaluation of composites. *IEEE Int. Conf. Acoust. Speech Signal Process.*, p. 1717–1720, Kyoto, March **2012** .
  - G. Rus, N. Bochud, J. Melchor, M. Alaminos, and A. Campos. Dispersive model selection and reconstruction for tissue culture ultrasonic monitoring. *International Congress on Ultrasonics*, p. 375–378, Gdansk, September **2011** .
  - N. Bochud, A. Gomez, G. Rus, J. L. Carmona, and A. Peinado. Robust parametrization for non-destructive evaluation of composites using ultrasonic signals. *IEEE Int. Conf. Acoust. Speech Signal Process.*, p. 1789–1792, Praga, May **2011** .
  - N. Bochud, A. Gomez, A. A. Fahim, and G. Rus. Impact damage characterization in composites using signal processing techniques. *12<sup>th</sup> East Asia-Pacific Conference on Structural Engineering and Construction*, p. 169–176, Hong-Kong, January **2011** .
  - A. M. Peinado, J. L. Carmona, N. Bochud, A. M. Gomez, and G. Rus. Representacion cepstral de ultrasonidos para evaluacion no-destructiva en placas de fibra de carbono. *41<sup>o</sup> Congreso Nacional de Acustica*, p. 1–8, León, October **2010** .


#### Contributions to book chapters.

- N. Bochud, and P. Laugier. Chapter 4: Axial Transmission: Techniques, Devices and Clinical Results. In *Bone Quantitative Ultrasound*, Springer, pages 55–94, **2022** .
- N. Bochud, A. M. Gomez, J. M. Soto, G. Rus, and A. M. Peinado. Chapter 5: Ultrasonic signal processing for nondestructive evaluation of impact-damaged composite plates. In *Advances in Materials Science Research*, Volume 22, Nova Science Publishers, pages 101–136, **2015** .
- R. Muñoz, G. Rus, N. Bochud, D. Barnard, J. Melchor, J. Chiachío, M. Chiachío, S. Cantero, A. Callejas, L. Peralta, and L. J. Bond. Chapter 9: Nonlinear ultrasonics for early damage prediction. In *Emerging*

*Design Solutions in Structural Health Monitoring Systems*, IGI Global, pages 171–206, **2015** .

- G. Rus, J. Melchor, A. Gómez, N. Bochud, J. Chiachío, M. Chiachío, L. Peralta, and P. Massó. *Introducción a la investigación [Introduction to Research]*, Primera Edición, Godel Editorial, pages 1–94, **2014** (ISBN: 978-8415873693).

#### **Patents and licenses.**

- N: ES2387770 B1. Title: Dispositivo y método de monitorización de muestras [Device and method for samples monitoring]. Researchers: G. Rus Calborg, N. Bochud, J. Melchor Rodríguez, J. Chiachío Ruano, M. Chiachío Ruano. Holder: G. Rus Carborg. Entity: University of Granada, 02/09/**2013** .
- N: PCT/ES2012/070380. Title: Transductor de ondas de torsión [Torsion wave transducer]. Researchers: G. Rus Calborg, N. Bochud, J. Manuel Melchor Rodríguez, J. Florido Navío, L. Maria Peralta Pereira. Holder: G. Rus Carborg. Entity: University of Granada / Andalusian Health Service, 20/12/**2012**.

#### **Invited seminars.**

- N. Bochud. Elastic guided waves: Applications to bone status assessment and the NDE of bonded structures, *Seminar at the Hamburg University of Technology*, 25 November, Online, **2020**.
- N. Bochud. Mechanical characterization of complex interphases using multiscale modeling and elastic waves, *Seminar at the University of Liege*, 9 March, Mechanics of Biological and Bioinspired Materials lab, **2020**.
- N. Bochud. Characterization of complex and “microstructured” media using elastic guided waves, *Workshop on elastodynamics of microstructured media*, 17–18 Octubre, École des Ponts – Paris Tech – Champs sur Marne, **2019**.
- N. Bochud. Caracterización de materiales complejos por ondas elásticas guiadas: aplicación al control no destructivo de estructuras y a la evaluación de la calidad ósea. *Conferencia del Máster de Estructuras de la Universidad de Granada*, Universidad de Granada, 14 December **2018**.
- N. Bochud. Caractérisation de milieux complexes par ondes élastiques guidées. *Séminaires Transverses du Laboratoire MSME*, Université Paris-Est Marne-la-Vallée, 5 October **2018**.
- N. Bochud, J Laurent, F Bruno, A Baelde, D Royer, and C Prada. Towards real-time assessment of material properties using elastic guided waves. *173<sup>rd</sup> Meeting of the Acoustical Society of America*, Boston, 25–29 June **2017**.
- N. Bochud. Elastic guided waves for the nondestructive testing and characterization of complex materials: Cortical bone assessment and bonding quality evaluation. *Seminar at the Polytechnic School of Linares*, University of Jaén, 16 June **2017**.
- N. Bochud. Model-based inverse problem for the ultrasonic characterization of complex materials: An overview of potential applications to composites, cortical bone and bonded layers. *Seminars and Workshops of the Langevin Institute*, Paris, 19 December **2016**.
- N. Bochud. Model-based inverse problem: Estimation of the cortical thickness and porosity of long bones using ultrasonic guided waves. *Workshop on long cortical bone assessment using ultrasonic guided waves: Signal processing, modeling, inversion, and clinical measurements*, Fudan University, Shanghai, 27 October **2015**.
- N. Bochud and G Rus. Harmonic generation technique for cortical bone damage assessment. *Workshop on Homogenization and micromechanics to understand the mechanical properties of bone*, School of Mathematics, Manchester, 26–27 March **2012**.