Dr. Mohamed Aziz BOUKRAA – Curriculum Vitae

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Research Interests

Mathematical Modeling, Inverse Problems, Wave Propagation, Seismic Imaging, Full Waveform Inversion, Numerical Analysis, Partial Differential Equations, Finite Element Method, Scientific Computing, High Performance Computing, Applications to realistic environments.

Education

2018–2021   Doctorate in Applied Mathematics, Laboratory of Mathematics Nicolas Oresme (LMNO), University of Caen Normandy, France.
Title: *Méthodes inverses à régularisation évanescente pour l'identification de conditions aux limites en théorie des plaques minces.* **English title:** *Fading regularization inverse methods for the identification of boundary conditions in thin plate theory.*
Thesis supervisor: Pr. Franck Delvare.   **Defense:** December 14, 2021.
2016–2018   Master's degree in Mathematics, Spec. Optimization and Mathematical Physics, University of Toulon, France.
2013–2016   Bachelor's degree in Mathematics, University Jean Monnet, Saint-Étienne, France.

Experience

Research Experience

Sep 2024 – Present   Postdoctoral Research Fellow, Department of Informatics, University of Oslo, Norway. *Research in inverse problems and image reconstruction in acoustics and elastography.* This position is part of the MSCA CO-FUND DSTrain programme. The project is carried out in collaboration with the Digital Signal Processing group (DSB), IFI, University of Oslo.
Sep 2022 – Août 2024   Postdoctoral position. INRIA (IDEFIX Team), Ensta Paris, Institut Polytechnique de Paris, and EDF R&D. *Development of inverse problem methodologies for interface imaging, application to the rock-concrete interface for a hydroelectric dam.*

Sep 2021 – Août 2022   Contractual assistant professor ("ATER"). Laboratoire de mathématiques Blaise Pascal, Polytech Clermont INP.

Sep 2018 – Dec 2021   Doctoral thesis. Laboratory of Mathematics Nicolas Oresme (LMNO), University of Caen Normandy, France. PDF link.

Mar 2018 – Aug 2018   Research internship (MSc). Alten SA, Alten Innovation Center, Chaville, France.

Mar 2017 – Jun 2017   Research internship (MSc). LIS Laboratory, University of Toulon, France.

Teaching Experience

Sep 2021 – Août 2022   Polytech Clermont INP. Contractual assistant professor (192h).

- Tutorials in Mathematics, Probability, Statistics, and Numerical Analysis.

- Lectures and tutorials for Architect-Engineer double degree.

Oct 2019 – Sep 2021   University of Caen Normandy. Part-time teacher (75h).

- Lectures and tutorials in Analysis, Complex Numbers, Geometry.

Skills

Languages: French (Native), Arabic (Native), English (Fluent), Spanish (Intermediate).
Software: Matlab, FreeFEM, PETSc, MPI, Python, Maple, LaTeX, Gmsh.

International Collaborations

Visiting Researcher at the National School of Engineers of Tunis – PHC Utique Project (2020, 2022). Collaboration with LAMSIN laboratory on finite element algorithms with fading regularization for inverse problems.

International Schools

- Bath Symposium on Inverse Problems and AI in Medicine, University of Bath, UK, June 2025. `https://bathsymposium.ac.uk/symposium/inverse-problems-and-artificial-intelligence-in-medicine/`

- Geilo Winter School 2025 on Inverse Problems, SINTEF/NTNU, Geilo, Norway, Jan 2025. `https://www.sintef.no/projectweb/geilowinterschool/2025-inverse-problems/`

- FrenchRomanian Summer School on Applied Mathematics, University of Bucharest, Romania, July 2019. `https://sites.google.com/site/marinliviu/french-romanian-summer-school-on-applied-mathematics/6th-french-romanian-summer-school-on-applied-mathematics-3-11-july-2019`

Publications and Communications

Journal Papers

1. **Boukraa, M. A.**, Delvare, F., Caillé, L.. Fading regularization method for an inverse boundary value problem associated with the biharmonic equation. *Journal of Computational and Applied Mathematics, 440, 115755, 2025.* `https://doi.org/10.1016/j.cam.2025.115755` `https://hal.science/https://doi.org/10.1016/j.cam.2025.115755`

2. **Boukraa, M. A.**, Amdouni, S., Delvare, F.. Fading regularization FEM algorithms for the Cauchy problem associated with the two-dimensional biharmonic equation. *Mathematical Methods in the Applied Sciences, 46(2), 2389–2412, 2023.* `https://doi.org/10.1002/mma.8651` `https://hal.science/https://doi.org/10.1002/mma.8651`

Conference Proceedings

1. **Boukraa, M. A.**, Audibert, L., Bonazzoli, M., Haddar, H., Vautrin, D.. High-Resolution Seismic Imaging for Dam-Rock Interface using Full-Waveform Inversion. *Waves 2024, Berlin, Germany, 2024.* `https://doi.org/10.17617/3.MBE4AA` `https://hal.science/https://doi.org/10.17617/3.MBE4AA`

2. **Boukraa, M. A.**, Bonazzoli, M., Haddar, H., Audibert, L., Vautrin, D.. Imaging a dam-rock interface with inversion of a full elastic-acoustic model. *11th International Conference on Inverse Problems in Engineering (ICIPE 2024), Rio de Janeiro, Brazil, 2024.* `https://hal.science/https://hal.archives-ouvertes.fr/hal-04661884`

3. **Boukraa, M. A.**, Audibert, L., Bonazzoli, M., Haddar, H., Vautrin, D.. Imagerie dinterface barrage-fondation par inversion de forme donde complète. *E3S Web of Conferences, 2024.* `https://doi.org/10.1051/e3sconf/202450404002` `https://hal.science/https://doi.org/10.1051/e3sconf/202450404002`

Talks in International Conferences

- 11th International Conference on Inverse Problems, Control and Shape Optimization (PICOF 2025), Hammamet, Tunisia, October 28–31 2025. `https://picof2025.sciencesconf.org/`

- IEEE International Ultrasonics Symposium (IUS 2025), Utrecht, Netherlands, April 2025. `https://2025.ieee-ius.org/`

- Ultrasonic Imaging and Tissue Characterization Conference (UITC 2025), Silver Spring, MD, USA, April 2025.

- 48th Scandinavian Symposium on Physical Acoustics (SSPA 2025), Geilo, Norway, January 26–29 2025. `https://www.norskfysisk.no/faggrupper/faggruppe-akustikk/sspa/`

- WAVES 2024 (16th International Conference on Mathematical and Numerical Aspects of Wave Propagation), Berlin, Germany, June 2024. `https://waves2024.mps.mpg.de/`

- 11th International Conference on Inverse Problems in Engineering (ICIPE24), Rio de Janeiro, Brazil, June 2024. `https://icipe2024.org/`

- 11th International Conference on Inverse Problems in odeling and Simulations (IPMS 2024), Malta, May 2024. `https://www.ipms-conference.org/ipms2024/`

- 11th Applied Inverse Problems Conference (AIP 2023), Göttingen, Germany, September 2023. `https://aip2023.de/`

- 10th International Conference on Inverse Problems, Control and Shape Optimization (PICOF'22), Caen, France, October 25–27 2022. `https://picof22.sciencesconf.org/`

- 10th International Conference on Inverse Problems in Engineering (ICIPE20), Francavilla al Mare (Chieti), Italy, May 15–19 2022. `https://iopscience.iop.org/article/10.1088/1742-6596/2444/1/011001`

Other Talks

- Journées Scientifiques AGAP Qualité Géophysique Appliquée, Poitiers, France, March 26–28 2024. `https://www.agapqualite.org/2023/07/11/journees-scientifiques-agap-26-au-28-mars-2024/`

- Congrès des Jeunes Chercheurs en Mécanique (Méca-J 2023), Online, August 28–30 2023. `https://mecaj2023.sciencesconf.org/`

- 11ème Biennale de la Société de Mathématiques Appliquées et Industrielles (SMAI 2023), Le Gosier, Guadeloupe, France, May 22–26 2023. `https://smai2023.math.cnrs.fr/fr/`

- Congrès Français de Mécanique (CFM 2022), Nantes, France, August 29 – September 2 2022. `https://cfm2022.fr/`

- 45ème Congrès National d'Analyse Numérique (CANUM 2022), Évian-les-Bains, France, June 13–17 2022. `https://canum2020.math.cnrs.fr`

- Congrès des Jeunes Chercheurs en Mécanique (Méca-J 2021), Online, August 25–27 2021. `http://meca-j.sciencesconf.org`

- 10ème Biennale de la Société de Mathématiques Appliquées et Industrielles (SMAI 2021), La Grande-Motte, France, June 21–25 2021. `https://smai2021.math.univ-toulouse.fr`

- 9ème Biennale de la Société de Mathématiques Appliquées et Industrielles (SMAI 2019), Guidel-Plages (Morbihan), France, May 13–17 2019. `http://smai.emath.fr/smai2019/index.php`

Activities of Collective Interest

- Participation at *"Semaines d'Etudes Mathématiques et Entreprises" (SEME)*, Pointe-à-Pitre, Guadeloupe, May 1519, 2023. semeantilles.sciencesconf.org Joint Work: "Optimal distribution for steam production". Industry Collaboration: Refinery Industry SARA (Pôle 972, Martinique).

- Organizing committee member of the international conference **PICOF22**, Caen, October 2527, 2022. picof22.sciencesconf.org

- Organization of the workshop *Chercheurs-Chercheuses*, Dôme de Caen, February 2, 2020.