

Zoïs Moitier

Postdoctoral researcher

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Professional Experiences

- 2020– **Postdoctoral researcher**, *Institute for Analysis (IANA)*, in the Karlsruhe Institute of Technology (Germany), under the supervision of Rainer Mandel.
- 2019–2020 **Postdoctoral researcher**, *Applied Mathematics department*, in University of California Merced (USA), under the supervision of Camille Carvalho.
- 2016–2019 **PhD thesis in Mathematics**, at *University of Rennes 1 (IRMAR, numerical analysis team)*, under the supervision of Stéphane Balac and Monique Dauge, “*Mathematical and numerical study of resonances in optical micro-cavities*”, [theses.fr].

Publications

Pré-publications

- 2021 **Nonlinear Helmholtz equations with sign-changing diffusion coefficient**, with Rainer Mandel and Barbara Verfürth. [[arXiv:2107.14516](https://arxiv.org/abs/2107.14516)] {code: doi.org/10.5281/zenodo.5140020}
- 2020 **Asymptotics for metamaterial cavities and their effect on scattering**, with Camille Carvalho. [[arXiv:2010.07583](https://arxiv.org/abs/2010.07583), [HAL-02965993](https://hal.archives-ouvertes.fr/hal-02965993)] {code: doi.org/10.5281/zenodo.4716361}

Publications

- 2021 **Quadrature by Parity Asymptotic eXpansions (QPAX) for scattering by high aspect ratio particles**, with Camille Carvalho, Arnold D. Kim, and Lori Lewis in *SIAM Journal Multiscale Modeling and Simulation*. [[arXiv:2105.02136](https://arxiv.org/abs/2105.02136), in press] {code: doi.org/10.5281/zenodo.4692601}
- Asymptotics for 2D whispering gallery modes in optical micro-disks with radially varying index**, with Stéphane Balac and Monique Dauge in *IMA Journal of Applied Mathematics*. [[arXiv:2003.14315](https://arxiv.org/abs/2003.14315), [HAL-02528150](https://hal.archives-ouvertes.fr/hal-02528150), doi.org/10.1093/imamat/hxab033]
- 2020 **Mathematical analysis of whispering gallery modes in graded index optical micro-disk resonators**, with Stéphane Balac, Monique Dauge, Yannick Dumeige, and Patrice Féron in *The European Physical Journal D*. [[HAL-02157635](https://hal.archives-ouvertes.fr/hal-02157635), doi.org/10.1140/epjd/e2020-10303-5]

Proceedings

- 2019 **Asymptotic expansions of Whispering Gallery Modes in graded index optical micro-cavities**, with Stéphane Balac and Monique Dauge, WAVES, Vienna (Austria). [[Link](#)]

Codes

- 2021 **Claudius**, a Python toolbox for analytic computations of scattering (under developement). [github.com/zmoitier/claudius]

Education

- 2015–2016 **Master’s Degree (Research)**, *University of Rennes 1*, Specialization: Partial Differential Equations and Numerical Analysis, *Summa cum laude*.
- 2014–2015 **Agrégation of Mathematics**, Scientific Computing option, Successful candidate.

Master's Degree (Teaching), at ENS Rennes and University of Rennes 1, Specialization: Mathematics and Teaching, *Summa cum laude*.

2013–2014 **National examination for the admission in third year at ENS Rennes**, in mathematics, Successful candidate.

2012–2013 **Bachelor's Degree**, at ENS of Lyon and University of Lyon 1, in mathematics.

2009–2012 **Preparatory Classes**, in Pierre Corneille high school, Rouen, two-year undergraduate intensive course in mathematics and physics, computer science option.

Research Conferences

As an invited speaker

- 2021 Nov. Talk at the seminar POEMS at Palaiseau (France).
- Oct. Talk at the workshop Numerical Waves in Nice (France).
- Jun. 10th SMAI conference, in the mini-symposium *Modélisation et simulation des phénomènes électromagnétiques en milieux complexes*, La-Grande-Motte (France).
- 2018 Dec. Talk at the PhD seminar of Cergy (France).
- Nov. Talk at the numerical analysis seminar, Bath (United Kingdom).
- Aug. Talk at 14th Franco-Romanian conference on applied mathematics in the mini-symposium *Mathematical Physics and related subjects*, Bordeaux (France).
- Mar. Talk at the ICCEM conference (IEEE International Conference on Computational Electromagnetic) in the mini-symposium *Mathematical Aspects of Computational Electromagnetic*, Chengdu (China). [Extended Abstract, [HAL-01715438](#)]
- Mar. Talk at PhD seminar of Nantes (France).
- 2017 Oct. Poster at 6th EDP-Normandie conference, Caen (France).

As a speaker or contributor

- 2021 Apr. IANA seminar at Karlsruhe Institute of Technology (Germany).
- Mar. SIAM Conference on Computational Science and Engineering (CSE21), Fort Worth (USA).
- 2019 Nov. Talk at the Waves Seminar, UC Merced (USA).
- Aug. Talk at WAVES, 14th International Conference on Mathematical and Numerical Aspects of Wave Propagation, Vienna (Austria).
- Mar. Poster at the young researchers days in PDE, Rennes (France).
- 2018 Jun. Talk at the 2nd analysis PhD day of IRMAR, Rennes (France).
- May Talk at the 44th CANUM conference, Cap d'Agde (France).
- 2017 Nov. Talk at the analysis PhD seminar of Rennes (France).
- Oct. Talk at the 5th Mathematics and Optics Days, Rennes (France).
- Jun. Poster at the 8th SMAI conference, La Tremblade (France).
- Mar. Talk at analysis PhD seminar of Rennes (France).

As a participant

- 2021 Sept. Summer School *Wave Phenomena: Analysis and Numerics*, Karlsruhe (Germany).
- 2018 Oct. Lebesgue PhD meeting of the Henri Lebesgue Center, Brest (France).
- Apr. Spring school, *Fundamentals and practice of finite elements*, Thematic Semester "Scientific Computing" of the Henri Lebesgue Center, Roscoff (France).
- 2017 Oct. Lebesgue PhD meeting of the Henri Lebesgue Center, Rennes (France).
- May Hyperbolic Equation and Mathematic Physic, Bordeaux (France).

- May WAVES, 13th International Conference on Mathematical and Numerical Aspects of Wave Propagation, Minneapolis (USA).
- Feb. Numeric and mathematical analysis for singularities, Rennes (France).
- 2016 Nov. Waves, boundaries and oscillations in numerical schemes, Rennes (France).
- Oct. Workshop C++: basics of the 11 and 14, Rennes (France).

Responsibilities

- 2021 Co-organizer of the minisymposium *Numerical methods for plasmonic related phenomena* at SIAM Conference on Computational Science and Engineering (CSE21), Fort Worth (USA).
- 2018–2019 Co-organizer of the analysis PhD seminar ([Landau](#)) of Rennes (France).
- Co-organizer of the [Lebesgue PhD meeting](#), Brest (France).
- Co-organizer of the PhD student analysis day, Rennes (France).

Teaching

- 2020–2021 Sobolev spaces, 10h (Master students in Mathematics).
- 2018–2019 Mathematical Fundamentals, flipped classroom, 30h (Computer Science and Electronics Bachelor).
- Numerical methods in analysis, 24h (Mathematics for Teaching Bachelor).
- Tutoring study group on a mathematical article (Mathematics Bachelor).
- 2017–2018 Mathematical Fundamentals, flipped classroom, 30h (Computer Science and Electronics Bachelor).
- Mathematic Tools 4, 20h (Physics Bachelor).
- Mathematical Tutoring, 6h (Computer Science and Electronics Bachelor).
- Lab work on eigenvalue computation ([TP2](#), 4h) during the spring school, *Fundamentals and practice of finite elements*, of the Henri Lebesgue Center, Roscoff (France).
- 2016–2017 Mathematic Tools 1, 26h (Physics Bachelor).
- Differential Equations 1, 24h (Mathematics Bachelor).
- Lab work, Differential Equations 1, 12h (Mathematics Bachelor).

Scientific dissemination

- 2018 Oct. Facilitator in mathematics during “Fête de la Science”, Rennes (France).
- Apr. Board for the French tournament for young mathematicians, Rennes (France).
- Jan. Talk for the “5 minutes Lebesgue”. [[Video](#)]
- 2017 Mar. Facilitator during “Forum des Mathématiques Vivantes”, Rennes (France).

Other skills

Programming languages

- Familiar with C and C++
- Julia
- Python

Languages spoken

- French (native language)
- English, TOEIC 855/990 in 2015

Software

- Maple, Matlab, Octave, and Scilab
- XLIFF++, FEM library in C++. [[Webpage](#)]
- Git and \LaTeX

Miscellaneous

- Driving License