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] {code: doi.org/10.5281/zenodo.5140020}

2020 **Asymptotics for metamaterial cavities and their effect on scattering**, with Camille Carvalho. [arXiv:2010.07583, 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, 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, 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, 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 devellopement). [`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).

Sept. Talk at the analysis PhD seminar of Rennes (France).

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

Software

- Maple, Matlab, Octave, and Scilab
- XLiFE++, FEM library in C++. [Webpage]
- Git and LaTeX

Languages spoken

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

Miscellaneous

- Driving License