Romain Mottier

https://romainmottier.github.io./ romain.mottier@outlook.com

Postdoctoral researcher in applied mathematics and computational physics. Strong expertise in numerical methods for PDEs, scientific computing (Fortran, C++, Python, Matlab)

Experiences

Research experiences

Postdoctoral researcher 10/2025 – now
University of Basel *Basel – Switzerland*

PhD in applied mathematics 10/2021 – 07/2025
Institut Polytechnique de Paris (IP Paris) & École Nationale des Ponts et Chaussées (ENPC) & Commissariat à l'Énergie Atomique (CEA) *Paris – France*
Non-conforming hybrid (HDG/HHO) finite elements methods for the numerical simulation of elasto-acoustic wave propagation.

Research intern 03/2021 – 08/2021
Office National d'Études et de Recherches Aérospatiales (ONERA) *Toulouse – France*
Implementation of Spectral Differences (SD) and a Mimetic method (CDO scheme) to solve Maxwell equations in the time domain.

Research intern 05/2020 – 08/2020
European Space Agency (ESA) *Nordwijck – Netherlands*
Numerical modeling of the temperature distribution on the surface and in the depths of Mercury.

Teaching experiences

Theoretical and practical work classes 01/2023 – 05/2023
Paris Dauphine University *Paris – France*
Grade: 2nd year of Bachelor's degree in Mathematics and Computer science
Course: **Numerical methods** (Nonlinear equations, polynomial interpolation, quadrature formulas, iterative and direct methods for solving linear systems, eigenvalues and eigenvectors computing)

Theoretical and practical work classes 09/2022 – 12/2022
Paris Sorbonne University *Paris – France*
Grade: 1st year of Master's degree in Computational Mechanics
Course: **Numerical methods** (Linear systems, finite differences, continuum mechanics)

Education

PhD in applied mathematics 10/2021 – 07/2025
Institut Polytechnique de Paris (IP Paris) & École Nationale des Ponts et Chaussées (ENPC) & Commissariat à l'Énergie Atomique (CEA) *Paris – France*
Non-conforming hybrid (HDG/HHO) finite elements methods for the numerical simulation of elasto-acoustic wave propagation.

University exchange: MSc Numerical Methods in Engineering 09/2020 – 02/2021
Universitat Politècnica de Catalunya (UPC) *Barcelona – Spain*
Numerical methods studied: Discontinuous Galerkin (DG), eXtended FEM (XFEM), Phase-field models, Meshless methods

MSc in engineering: Modeling and fluid-strucutre computation 09/2018 – 09/2021
Université de Toulon, École d'ingénieur SeaTech *Toulon – France*
Cross-skills in numerical methods, applied mathematics and mechanics:
Finite Volume / Finite Elements / Finite Differences / Monte-Carlo /
Newton–Raphson / Runge–Kutta / Continuum Mechanics / Fluid Mechanics

Skills

Applied mathematics - Numerical methods - Numerical analysis - Numerical modeling
Implementation of numerical methods to perform numerical simulations for problems involve in science and engineering
Programming languages: Fortran, C/C++, Python, Matlab, LaTeX, Git

Research work

Articles & preprints

Unfitted HHO methods stabilized by polynomial extension for elliptic interface problems
Submitted to SINUM - preprint: [arXiv]

Hybrid high-order methods for elasto-acoustic wave propagation in the time domain
Submitted to M2AN - preprint: [arXiv]

Elasto-acoustic wave propagation in geophysical media using hybrid high-order methods on general meshes
Submitted to CMAME - preprint: [arXiv]

Conferences

Hybrid high-order methods for time-dependent, coupled elasto-acoustic wave propagation
World Congress on Computational Mechanics (WCCM) *Vancouver (Canada) - July 2024*
European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS) *Lisbon (Portugal) - June 2024*
Congress of Young Researchers in Applied Mathematics (CJCMA) *Paris (France) - September 2023*

Unfitted HHO method stabilized by polynomial extension
National Congress of Numerical Analysis (CANUM) *Ile de Ré (France) - May 2024*

Numerical study of energy transfer in sedimentary basins using high-order methods
American Geophysical Union (AGU) *San Francisco (USA) - December 2023*

Referees

Alexandre Ern Main advisor (PhD)
Researcher at CERMICS since 1995, Senior Researcher since 2011
Joint Senior Researcher at INRIA in the SERENA team (since 2016)
Professor at Ecole des Ponts (since 1997), Associate Professor at Ecole Polytechnique (2010-22)
Email adress: alexandre.ern@enpc.fr

Laurent Guillot Industrial advisor (PhD)
Researcher at CEA
Email adress: laurent.guillot.blr@gmail.com

Guillaume Delay
Assistant professor at Sorbonne University, Laboratoire Jacques-Louis Lions
Researcher at INRIA in the COMMEDIA team
Email adress: guillaume.delay@sorbonne-universite.fr

Guillaume Legendre Advisor (Teaching experience)
Professor at Paris Dauphine University
Email adress: guillaume.legendre@ceremade.dauphine.fr