Ilaria Fontana

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EDUCATION

Ph.D. degree, University of Montpellier and EDF Lab Paris-Saclay (CIFRE agreement)   *2018–2022*
Mathématiques et Modélisation (Mathematics and Modelisation)   Palaiseau (France)
- Thesis title: *Interface problems for dam modeling* (*Problèmes d'interfaces pour les ouvrages hydrauliques*)
- Topics: Finite element approximation methods for PDEs, Modeling of hydraulic structure joints with cohesive zone model, A posteriori error estimate techniques for contact problems via equilibrated stress reconstruction
- Supervisors: Prof. Daniele A. Di Pietro (University of Montpellier), Eng. Kyrylo Kazymyrenko (EDF Lab Paris-Saclay)
- Research units: IMAG - Institut Montpelliérain Alexander Grothendieck, and IMSIA - Institute of Mechanical Sciences and Industrial Application
- Defense date: March 31st 2022

Master degree, University of Udine   *2016–2018*
Applied Mathematics   Udine (Italy)
- Thesis title: *Numerical Bifurcation of Equations with Infinite Delay via Pseudospectral Collocation*
- Topics: DDEs with infinite delay, Dynamical systems generated by DDEs, Orthogonal polynomials
- Supervisor: Prof. Rossana Vermiglio
- Final grade: 110/110 cum laude

Bachelor degree, University of Udine   *2013–2016*
Mathematics   Udine (Italy)
- Thesis title: *Il teorema del passo di montagna* (*Mountain Pass Theorem*)
- Supervisor: Prof. Rodica Toader
- Final grade: 110/110 cum laude

EXCELLENCE SCHOLARSHIPS

Thesis Research fellowship   *2018*
Three months of Master thesis research at the Department of Mathematics and Statistics of the University of Helsinki (Finland) in collaboration with prof. Mats Gyllenberg and with the Biomathematics research group.

"Scuola Superiore" (School for Advanced Studies) fellowship   *2013–2018*
The School for Advanced Studies of the University of Udine is an institution for higher education beside the university. Admitted students follow additional courses and are examined every year in two occasions. The school covers university student fees and provides a residence for five years (Bachelor and Master degrees).

WORK, TEACHING & OUTREACH EXPERIENCES

Research Engineer, EDF (main French electric company)   *2018–2022*
R&D Division Lab Paris-Saclay
- Development of a posteriori error estimation applied to mechanical problems modeled with PDEs, and introduction of a **fully adaptive algorithm** including stopping criteria for the nonlinear solver and automatic tuning of some parameters. Implementation with FreeFem++.
- Development of models for the materials and their cohesive zones, both from a theoretical point of view, and with the creation of tailored FEA tools for the industry. Implementation with Python, Fortran and the numerical

simulation tool code_aster.

o Collaboration between different divisions (also outside R&D) in order to provide customer focused solutions to the final users. This taught me how to be autonomous, organized and willing to interact and work closely with diverse audiences.

o Presentation of the results in several international conferences, including the *6th U.S. National Congress on Computational Mechanics* in Chicago.

Student tutor, University of Udine   *2017–2018*
Student tutor for Bachelor and Master degree in Mathematics of the University of Udine. In charge of teaching assistance and outreach activities.

o Effective communicator, advertising university programs in person and on social media to diverse audiences.

o Improving the customer experience, specifically in the Mathematics Department, by identifying bottlenecks in the course load and by proposing solutions to the department directors.

Student representative, University of Udine   *2014–2018*
Student representative for Bachelor and Master degree in Mathematics of the University of Udine.

PUBLICATIONS

o D. A. Di Pietro, I. Fontana, K. Kazymyrenko, *A posteriori error estimates via equilibrated stress reconstructions for contact problems approximated by Nitsche's method.* Comput. Math. Appl., 2022, **111**:61–80. DOI: 10.1016/j.camwa.2022.02.008.
  - Preprint: arXiv, Hal

o I. Fontana, K. Kazymyrenko, D. A. Di Pietro, *Hyperelastic nature of the Hoek–Brown criterion.*
  - Submitted. Preprint: Hal

o I. Fontana, K. Kazymyrenko, *A interface model for dams with cohesive zone model coupling damage and plasticity.*
  - In preparation. Submission previewed within 2022.

o I. Fontana, R. Vermiglio, *An experimental investigation on weighted orthogonal polynomials for equations with infinite delay.*
  - In preparation.

CONFERENCES TALKS & SEMINARS

Seminar in the ERMES Department at EDF R&D   *March 2022*
Interface Problems for Dam Modeling   Palaiseau (France)
Invited seminar (Pre-defense)

EFEF2020, 18th European Finite Element Fair   *September 2021*
A Posteriori Error Estimation via Equilibrated Stress Reconstruction for Unilateral   Paris (France)
Contact Problems
Abstract selected for oral presentation

USNCCM16, 16th U.S. National Congress on Computational Mechanics   *July 2021*
A Posteriori Error Estimation via Equilibrated Stress Reconstruction for Unilateral Contact Online
Problems
Abstract selected for oral presentation

ADMOS 2021, 10th International Conference on Adaptive Modeling and Simulation   *June 2021*

A Posteriori Error Estimation via Equilibrated Stress Reconstruction for Unilateral Contact Problems   Online

Abstract selected for oral presentation

Seminar in the CDLab of the University of Udine   *June 2021*

A Posteriori Error Estimation via Equilibrated Stress Reconstruction for Unilateral Contact Problems   Online

Invited seminar

Congrés Français de Mécanique   *August 2019*

Lois mécaniques pour les ouvrages hydrauliques (Behavioral laws for hydraulic structures)   Brest (France)

Abstract selected for oral presentation

Seminar in the CDLab of the University of Udine   *October 2018*

Numerical Bifurcation of Equations with Infinite Delay via Pseudospectral Collocation   Udine (Italy)

Master student seminar

Seminar in the CDLab of the University of Udine   *September 2018*

Laguerre-type orthogonal polynomials and transformation of the Chebyshev nodes   Udine (Italy)

Master student seminar

Seminar in the CDLab of the University of Udine   *July 2018*

A model describing vapour and droplets   Udine (Italy)

Master student seminar

CONFERENCES POSTERS

Journées scientifiques du GdR MaNu   *October 2021*

A posteriori error estimates via equilibrated stress reconstructions for contact problems approximated by Nitsche's method   Le Croisic (France)

Colloque National MECAMAT 2019 – **Rupture des Matériaux et des Structures**   *January 2019*

A model describing vapour and droplets   Aussois (France)

COMPUTER SKILLS

Programming languages	*Python, C/C++, FreeFem++, R, Fortran, MATLAB, Mathematica*
Other	LaTeX, *Beamer, Microsof Office (Word, Excel, Power Point), code_aster, Linux, Git*

LANGUAGES

Italian	*Mother tongue*
English	*Workplace - Daily*
French	*Workplace - Daily*
Spanish	*High-school*