Curriculum vitæ

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Keywords: mathematical modelling, free surface flows, hydrodynamics, variational principles, partial differential equations, finite volumes, spectral methods, high-performance scientific computing

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1 Curriculum vitæ

1.1 Personal information

First name	Denys
Last name	DUTYKH
Date of birth	the 17th August 1982
Place of birth	Pologui, Ukraine
Citizenships	French, Ukrainian
Family status	married, two children (2017, 2020)
Driving licence	Category B (France, UAE)
Professional address	Mathematics Department Khalifa University of Science and Technology P O Box 127788 AD, Abu Dhabi, UAE
Personal address 1	Saraya Tower, Jabal Murayshid street, Appt. 1601, Al Sa'Adah area, Abu Dhabi AD, United Arab Emirates
Personal address 2	116 rue de la Digue, 73360 Les Échelles France
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Personal e-mail 2	Denys.Dutykh@crans.org
Home page	https://www.denys-dutykh.com/
Public repository	https://github.com/dutykh/
ResearchGate	https://www.researchgate.net/profile/Denys-Dutykh
Google Scholar	https://scholar.google.com/citations?user=cvOVca4AAAAJ
ResearcherID	**R-8861-2019**
ORCID	**0000-0001-5247-2788**

2 Awards

- Prime d'Excellence Scientifique (PES) attributed by INSMI (C.N.R.S.), 2014 – 2018
- Le Prix La Recherche 2007, nomination "Environment" sponsored by Veolia, research: "Extreme waves: from physics to the effective prevention". The ceremony was held on the 27$^{\text{th}}$ of November 2007 at Luxembourg Palace, Paris, France
- Best Student Paper Award at "*The Fifth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory*", Athens, GA, USA, April 16 – 19, 2007

2.1 Professional societies memberships

- Society for Industrial and Applied Mathematics (SIAM) (Member N$^{\text{o}}$ 020992425)
  - SIAG on Nonlinear Waves and Coherent Structures membership
- American Mathematical Society (AMS) (Member N$^{\text{o}}$ DTDNXH)
- European Mathematical Society (EMS) (Member N$^{\text{o}}$ 22680)
- European Geosciences Union (EGU) (Member N$^{\text{o}}$ 525335)
- Société de Mathématiques Appliquées et Industrielles (SMAI) (Member N$^{\text{o}}$ 6908)
- Société Mathématique de France (SMF) (Member N$^{\text{o}}$ 18091)
- International Association for Hydro-Environment Engineering and Research (IAHR) (Member N$^{\text{o}}$ 92055)
- International Solar Energy Society (ISES) (Professional Silver membership)
- GDR CNRS 2948: Groupement de Recherche MOAD (2005 – 2009): *MOdélisation, Asymptotique, Dynamique non-linéaire*

3 Patents

1. **Title**: "*Procédé d'estimation d'une tension de claquage d'une cellule photovoltaïque*". Patent number and publication date: **WO2024110535 — 2024-05-30**

   https://data.inpi.fr/brevets/WO2024110535/

   Inventors: Long Ha Duy (CEA), Carlos Cardenas (CEA), Mohamed Amhal and Denys Dutykh (CNRS/USMB)

2. **Title**: "*Procédé d'estimation d'une tension de claquage d'une cellule photovoltaïque*". Patent number and publication date: **EP4376296 — 2024-05-29**

   https://data.inpi.fr/brevets/EP4376296/

   Inventors: Long Ha Duy (CEA), Carlos Cardenas (CEA), Mohamed Amhal and Denys Dutykh (CNRS/USMB)

3. **Title**: "*Procédé d'estimation de l'état de charge d'une batterie au plomb en situation d'autodécharge*". Patent number and publication date: **EP4198535 — 2023-06-21**

   https://data.inpi.fr/brevets/EP4198535/

   Inventors: Mikaël Cugnet (CEA), Denys Dutykh (CNRS/USMB), Angel Kirchev (CEA) and Florian Gallois (USMB).

4. **Title**: "*Procédé d'estimation de l'état de charge d'une batterie au plomb en situation d'autodécharge*". Patent number and publication date: **FR3130999 — 2023-06-23**

   https://data.inpi.fr/brevets/FR3130999/

   Inventors: Mikaël Cugnet (CEA), Denys Dutykh (CNRS/USMB), Angel Kirchev (CEA) and Florian Gallois (USMB).

5. **Title**: "*Method for determining the state of a system and device implementing said methods*". US Patent number and publication date: **2022/0405346 A1 — 2022-12-22**

   https://patentimages.storage.googleapis.com/53/b9/14/f5d40fbcc8116f/US20220405346A1.pdf

   Inventors: Sylvain Lespinats (CEA), Benoît Colange (CEA), Denys Dutykh (CNRS/USMB) and Laurent Vuillon (USMB).

6. **Title**: "*Procédé de détermination de l'état d'un système et dispositif mettant en oeuvre lesdits procédés*". Patent number and publication date: **CN114902214A — 2022-08-12**

   https://worldwide.espacenet.com/publicationDetails/biblio?CC=CN&NR=114902214&KC=A#

   Inventors: Sylvain Lespinats (CEA), Benoît Colange (CEA), Denys Dutykh (CNRS/USMB) and Laurent Vuillon (USMB).

7. **Title**: "*Procédé de détermination de l'état d'un système et dispositif mettant en oeuvre lesdits procédés*". Patent number and publication date: **EP4049148A1 — 2022-08-12**

   https://data.inpi.fr/brevets/EP4049148

   Inventors: Sylvain Lespinats (CEA), Benoît Colange (CEA), Denys Dutykh (CNRS/USMB) and Laurent Vuillon (USMB).

8. **Title**: "*Procédé d'analyse et procédé de détermination et de prédiction du régime de fonctionnement d'un système énergétique*". Patent number and publication date: **FR3099596 — 2021-02-05 (BOPI 2021-05)**

   https://data.inpi.fr/brevets/FR3099596

   Inventors: Sylvain Lespinats (CEA), Benoît Colange (CEA), Julien Berger (USMB), Denys Dutykh (CNRS/USMB) and Hugo Geoffroy (USMB).

9. **Title**: "*Procédé de détermination de l'état d'un système et dispositif mettant en oeuvre lesdits procédés*". Patent number and publication date: **WO2021078712A1 — 2021-04-29**

   https://data.inpi.fr/brevets/WO2021078712

   Inventors: Sylvain Lespinats (CEA), Benoît Colange (CEA), Denys Dutykh (CNRS/USMB) and Laurent Vuillon (USMB).

10. **Title**: "*Procédé de détermination de l'état d'un système et dispositif mettant en oeuvre lesdits procédés*". Patent number and publication date: **FR3102263A1 — 2021-04-23 (BOPI 2021-16)**

    https://data.inpi.fr/brevets/FR3102263

    Inventors: Sylvain Lespinats (CEA), Benoît Colange (CEA), Denys Dutykh (CNRS/USMB) and Laurent Vuillon (USMB).

4 Entrepreneurship

September 2023 – August 2024: Chief Scientific Advisor at Causal Dynamics, a startup founded by Drs. Ashkan Rafiee and Nitin Repalle at Nedlands (Perth area), Western Australia, Australia

5 Professional experience

January 2026 – present: Associate Dean of Graduate Studies, College of Computing and Mathematical Sciences, Khalifa University of Science and Technology, Abu Dhabi, United Arab Emirates

August 2022 – present: Associate Professor at the Mathematics Department, Khalifa University of Science and Technology, Abu Dhabi, United Arab Emirates

August 2022 – January 2028: On leave (*en détachement*) from C.N.R.S. to Khalifa University of Science and Technology, Abu Dhabi, United Arab Emirates

November 2012 – July 2022: Chargé de recherche C.N.R.S. of the 1st class (formerly CR1, presently CN – Classe Normale) at INSMI affiliated with the Laboratory of Mathematics (LAMA – UMR 5127), University Savoie Mont Blanc, France

September 2012 – December 2013: Senior Research Fellow (on temporal leave from C.N.R.S.) at the School of Mathematics and Statistics, University College Dublin, Ireland (working on ERC AdGr "MULTIWAVE" project)

October 2009 – October 2012: Chargé de recherche C.N.R.S. of the 2nd class (CR2, titulaire) at INSMI affiliated with the Laboratory of Mathematics (LAMA – UMR 5127), University of Savoie[1], France

October 2008 – September 2009: Chargé de recherche C.N.R.S. stagiaire at INSMI affiliated with the Laboratory of Mathematics (LAMA – UMR 5127), University of Savoie[1], France

December 2007 – September 2008: Post-doctoral fellow[2] at LRC Méso CEA DAM/CMLA under the direction of Frédéric DIAS and Jean-Michel GHIDAGLIA

October 2005 – December 2007: PhD student and Teaching Assistant (*Moniteur*) at Centre de Mathématiques et de Leurs Applications (CMLA UMR 8536), École Normale Supérieure de Cachan, France

6 Education and Training

December 2010: Habilitation à Diriger des Recherches defended at the Laboratory of Mathematics (LAMA), University of Savoie[3]. Title: "*Mathematical modeling in the Environment*"

October 2005 – December 2007: PhD in Applied Mathematics at CMLA, Ecole Normale Supérieure de Cachan. Advisor: Professor Frédéric DIAS. Title: "*Mathematical modeling of tsunami waves*"

October 2004 – July 2005: Master Degree in "*Numerical methods for continuum mechanics models*", Ecole Normale Supérieure de Cachan, rank: **1**/10

- Research dissertation: "*Moving load on a layered floating ice sheet*" under the supervision of Frédéric DIAS. Grade: **19**/20

September 2003 – June 2004: Master's Degree in Mathematical Modelling, Faculty of Applied Mathematics, Oles Honchar National University, Dnepropetrovsk, Ukraine

- Research dissertation: "*Harmonic oscillations of an inhomogeneous elastic layer under the action of a stamp*" under the supervision of Vladimir LAMZYUK. Grade: **5**/5

[1] Since the 27th of May 2014, University of Savoie changed the name to University Savoie Mont Blanc.
[2] This fellowship was basically funded by the 3rd year of my PhD thesis scholarship since the thesis was defended within two years.
[3] Nowadays, University of Savoie Mont Blanc

September 1999 – June 2003: Bachelor's Degree in Applied Mathematics at the Faculty of Applied Mathematics, Oles Honchar National University, Dnepropetrovsk, Ukraine

- Research dissertation: "*Harmonic oscillations of an inhomogeneous elastic layer*" under the supervision of Vladimir Lamzyuk. Grade: **5**/5

September 1997 – May 1999: School N° 23, class specialized in physics, Dnepropetrovsk, Ukraine

September 1989 – May 1997: School N° 83, Dnepropetrovsk, Ukraine

6.1 Academic qualifications

Remark 1 *Qualification in France is an official permission to apply for Professor and Assistant Professor positions in the national education system. All demands are examined once per year by "Conseil National des Universités" (CNU).*

Section	*Grade*	*Validity*	*Field*
26	Professor	2011 – 2015	Applied Mathematics
26	Professor	2015 – 2019	Applied Mathematics
37	Professor	2011 – 2015	Physical Oceanography
26	Assistant Professor	2008 – 2012	Applied Mathematics
60	Assistant Professor	2008 – 2012	Mechanics

6.2 Research visits abroad

November 2018: Visitor at Marine Systems Institute, Tallinn University of Technology, Tallinn, Estonia

October 2017: Visitor at Marine Systems Institute, Tallinn University of Technology, Tallinn, Estonia

March 2017: Visitor at Victoria University of Wellington, School of Mathematics and Statistics, New Zealand

February 2017: Visitor at Al-Farabi Kazakh National University, Faculty of Mechanics and Mathematics, Almaty, Kazakhstan

April 2016: Visitor at Pontifical Catholic University of Paraná, Laboratório de Sistemas Térmicos (LST), Curitiba, Brazil

February 2016: Visitor at Simion Stoilow Institute of Mathematics of the Romanian Academy (IMAR), Bucharest, Romania

November 2015: Visitor at Simion Stoilow Institute of Mathematics of the Romanian Academy (IMAR), Bucharest, Romania

October 2015: Visitor at Institute of Computational Technologies, Siberian Branch of RAS, Novosibirsk, Russian Federation

February 2015: Visiting research fellow at the Basque Center for Applied Mathematics (BCAM), Bilbao, Spain

December 2014: Visitor at Al-Farabi Kazakh National University, Faculty of Mechanics and Mathematics, Almaty, Kazakhstan

October – November 2014: Visitor at the Johannes Kepler Universität Linz, Institut für Analysis, Austria

July 2014: Visitor at RIMS (Kyoto University) and Keio University, Japan

April 2014: Visitor at the Johannes Kepler Universität Linz, Institut für Analysis, Austria

May 2013: Visitor at the Fields Institute (Toronto, Canada) in the framework of the Thematic Program on the Mathematics of Oceans

April 2012: Visitor at the Georgia Institute of Technology, School of Electrical and Computer Engineering, Atlanta, Georgia

March 2012: Visiting research fellow at the Basque Center for Applied Mathematics (BCAM), Bilbao, Spain

February 2012: Applied Mathematics Department, University of Valladolid, Spain

June 2011: Fields Institute, University of Toronto, Canada

October 2011: Department of Mathematics, University of Bergen, Norway

July 2011: Applied Mathematics Department, University of Valladolid, Spain

May 2010: Wolfgang Pauli Institute, Vienna, Austria

March 2010: School of Mathematical Sciences, University College Dublin, Ireland

September 2009: Wolfgang Pauli Institute, Vienna, Austria

7 Other qualifications and skills

7.1 Continuous professional education

January 2023: Completion of the CITI Program on “Responsible Conduct of Research in Physical Sciences”

7.2 Computer skills

Programming languages	C/C++, Fortran, Pascal
Script languages	Python, Matlab
Operating systems	Linux/Unix, Windows, Dos
Math software	Maple, MatLab, Mathematica, Scilab, Octave, Maxima
FEM	FreeFem++, FreeFEM3D
Scientific libraries	OpenFOAM, Deal.II, libMesh, gmm++, blitz++, gsl, FFTW
Meshers	GiD, GMSH
Visualisation	ParaView, OpenDX, MatLab, gnuplot
Office	LaTeX, OpenOffice, AbiWord

7.3 Foreign language skills

Ukrainian	native language
Russian	native language
French	almost native language
English	fluent
Italian	basic knowledge
Arabic	basic knowledge (Emarat dialect)

8 Research activities

8.1 Scientific interests

- Broadly, my scientific interests can be described by the following categories:
  - Machine Learning
    - dimensionality reduction methods
    - visual data exploration
  - Fluid mechanics
    - free surface flows
    - models in shallow and deep waters
    - variational methods and geometric mechanics
    - water wave run-up
    - compressible and two-phase flows
  - Heat and Mass Transfer in porous materials
  - Solid mechanics
    - co-seismic displacements computation
    - theory and dynamics of dislocations

    - ∗ sources and propagation of seismic waves
  - Numerical methods and scientific computing
    - ∗ finite volumes
    - ∗ finite elements
    - ∗ pseudo-spectral methods
    - ∗ geometric integration methods

- More specifically, here are some current areas of my active research:

  Shallow waters: Quest for improved shallow water models (dispersive effects, large bathymetry variations). Focusing and resonant effects during wave/wall and wave/beach interactions

  Deep waters: Quest for integrable models. Computation of breathers in higher-order models.

  Full Euler: Development of fast and arbitrarily accurate algorithms for the computation of regular and singular travelling gravity and capillary-gravity wave solutions. Direct simulation of the free surface Euler dynamics

  Tsunami generation: Study of the energy transfer from the bottom motion to water waves. Construction of realistic co-seismic bottom displacements during underwater earthquakes

  Geometric integration: Design and practical assessment of symplectic and multi-symplectic schemes performance in the long time integration of dispersive PDEs

  Numerics: Development of higher order finite volume, finite element and spectral methods for dispersive wave equations

  Solitonic gases: Direct simulation of solitonic gases. Verification and validation of the kinetic approach to solitonic gas modelling

- The present list can evolve depending on new contacts that I will make in the future.

8.2 Theses

8.2.1 Habilitation thesis

Habilitation à Diriger des Recherches in Applied Mathematics

TITLE:	"*Mathematical modeling in the Environment*"
ADVISOR:	Didier BRESCH (DR CNRS, University of Savoie)
MANUSCRIPT:	http://tel.archives-ouvertes.fr/tel-00542937/

Habilitation was defended on 3rd December 2010 at the University of Savoie after a review by:

- Benoît DESJARDINS (Associated Professor, ENS Ulm),

- Florian De Vuyst (Professor, ENS de Cachan),
- Christian Kharif (Professor, École Centrale de Marseille),
- Paul Milewski (Professor, University of Wisconsin, Madison)

Committee composition:

Didier Bresch	DR CNRS, Univ. Savoie	Examinator
Thierry Colin	Professor, Univ. Bordeaux	President
Benoît Desjardins	Associated Professor, ENS Ulm	Referee
Florian De Vuyst	Professor, ENS de Cachan	Referee
Frédéric Dias	Professor, Univ. College Dublin	Examinator
Christian Kharif	Professor, Centrale Marseille	Referee
David Lannes	DR CNRS, ENS Ulm	Examinator
Paul Milewski	Professor, Univ. Wisconsin	Referee

Abstract. The present manuscript is devoted to the mathematical modelling of several environmental problems ranging from water waves to powder-snow avalanches. This Habilitation is organized globally in three parts. The first part is essentially introductive and also contains a complete description of my scientific activities.

Scientific works dealing with water waves are regrouped in Part II. The spectrum of covered topics is large. We start by proposing in Chapter 3 a generalized Lagrangian for the water wave problem. This generalization allows for easy and flexible derivation of approximate models in shallow, deep and intermediate waters. Some questions of viscous wave damping are also investigated in the same chapter. Chapter 4 is entirely devoted to various aspects of tsunami wave modelling. We investigate the complete range of physical processes from generation through energy transformations and propagation up to the run-up onto coasts. The next Chapter 5 is devoted specifically to the numerical simulation and mathematical modelling of the inundation phenomena. This question is studied using various approaches: Nonlinear Shallow Water Equations (NSWE) solved analytically and numerically, Boussinesq-type systems, and two-fluid Navier-Stokes equations.

In Part III, we investigate two important questions belonging to the field of multi-fluid flows. Chapter 6 is essentially devoted to the formal justification of the single-velocity two-phase model proposed earlier for aerated flow modelling. Several numerical results are presented as well. Moreover, similar analytical computations performed in a simpler barotropic setting are provided in Appendix A. These results could apply, for example, to the simulation of violent wave breaking.

Finally, in Chapter 7, we propose a novel model for powder-snow avalanche flows. This system is derived from classical bi-fluid Navier-Stokes equations and has several nice properties. Numerical simulations of the avalanche interaction with obstacles are also presented.

Keywords: free surface flows, variational methods, finite volumes, dispersive waves, runup, two-phase flows, snow avalanches

8.2.2 PhD thesis

PhD degree from École Normale Supérieure de Cachan in Applied Mathematics

Title:	"*Mathematical modeling of tsunami waves*"
Advisor:	Frédéric Dias (Professor, ENS de Cachan)
Manuscript:	http://tel.archives-ouvertes.fr/tel-00194763/

Dissertation defended on 3rd December 2007 at École Normale Supérieure de Cachan after a review by:

- Jean-Claude Saut (Professor, University Paris-Sud, Orsay),
- Didier Bresch (DR CNRS, University of Savoie),

Committee composition:

Jean-Michel Ghidaglia	Professor, ENS de Cachan	Examinator
Jean-Claude Saut	Professor, Paris-Sud	Referee & President
Didier Bresch	DR CNRS, University of Savoie	Referee
Costas Synolakis	Professor, USC	Examinator
Vassilios Dougalis	Professor, University of Athens	Examinator
Daniel Bouche	HDR, CEA/DAM IdF	Invited member
Frédéric Dias	Professor, ENS de Cachan	Advisor

USC = University of Southern California

Abstract. This thesis is devoted to tsunami wave modelling. The life of tsunami waves can be conditionally divided into three parts: generation, propagation and inundation (or run-up). In the first part of the manuscript, we consider the generation process of such extreme waves. We examine various existing approaches to its modelling. Then, we propose a few alternatives. The main conclusion is that the seismology/hydrodynamics coupling is poorly understood at the present time.

The second chapter essentially deals with Boussinesq equations, which are often used to model tsunami propagation and sometimes even run-up. More precisely, we discuss the importance, nature and inclusion of dissipative effects in long-wave models.

In the third chapter, we slightly change the subject and turn to two-phase flows. The main purpose of this chapter is to propose an operational and simple set of equations in order to model wave impacts on coastal structures. Another important application includes wave sloshing in liquified natural gas carriers. Then, we discuss the numerical discretization of governing equations in the finite volume framework on unstructured meshes.

Finally, this thesis deals with a topic which should be present in any textbook on hydrodynamics, but it is not. We mean visco-potential flows. We propose a novel and sufficiently simple approach for weakly viscous flow modelling. We succeeded in keeping the simplicity of the classical potential flow formulation with the addition of viscous effects. In the case of

finite depth, we derive a correction term due to the presence of the bottom boundary layer. This term is nonlocal in time. Hence, the bottom boundary layer introduces a memory effect to the governing equations.

Keywords: Water waves, tsunami generation, Boussinesq equations, two-phase flows, visco-potential flows, finite volumes

8.3 List of present and past collaborators:

The total number: **213** *(in alphabetical order)*:

Obinna Abah: School of Mathematics, Statistics and Physics, Newcastle University, Newcastle upon Tyne, United Kingdom

Teh Sabariah Binti Abd Manan: Institute of Tropical Biodiversity and Sustainable Development, Universiti Malaysia Terengganu, Terengganu, Malaysia

Ahmed Alkarory Abdalazeez: (formerly at) Department of Marine Systems, School of Science, Tallinn University of Technology, Tallinn, Estonia

Nizar Abcha: Laboratoire Morphodynamique Continentale et Côtière (UMR 6143 M2C), Université de Caen Normandie, Caen, France

Madina Abdykarim: Suleyman Demirel University (SDU), Kaskelen, Almaty region, Kazakhstan

Iskander Abroug: Laboratoire Morphodynamique Continentale et Côtière (UMR 6143 M2C), Université de Caen Normandie, Caen, France

Céline Acary-Robert: Laboratoire Jean Kuntzmann (LJK), Université Grenoble Alpes, Grenoble, France

Amen Agbossou: Laboratoire LOCIE UMR 5271, Polytech Annecy–Chambéry, Le Bourget-du-Lac, France

Amirrudin Ahmad: Faculty of Science and Marine Environment, Universiti Malaysia Terengganu, Malaysia

Elena Akhmatskaya: BCAM – Basque Center for Applied Mathematics, Bilbao, Spain

Anas AL-Aghbari: Center for Membrane and Advanced Water Technology, Department of Mechanical Engineering, Khalifa University of Science and Technology, Abu Dhabi, United Arab Emirates

Norshamsuri Ali: Advanced Communication Engineering Centre of Excellence, University Malaysia Perlis, Kangar, Malaysia

Maryam Al Zohbi: (formerly at) Laboratoire J.A. Dieudonné, Université Côte d'Azur, Nice, France

Alberto Amato: Labotatoire Physiologie Cellulaire et Végétale (LPCV), CEA, CNRS, INRA, Grenoble, France

Mohamed Amazioug: Department of Physics, Ibnou Zohr University, Agadir, Morocco

Muhammad Asjad: Department of Physics, Simon Fraser University, Burnaby, Canada

Aydar Assylbekuly: (formerly at) Khoja Akhmet Yassawi International Kazakh–Turkish University, Turkistan, Kazakhstan

Laurence Audin: ISTerre (UGA) and Institut de Recherche pour le Développement (IRD), Grenoble, France

Michaël Aupetit: Qatar Computing Research Institute, Hamad Bin Khalifa University, Doha, Qatar

Zeinabou A. Babou: Mathematics Department, Khalifa University of Science and Technology, Abu Dhabi, UAE

Mathilde Banjan: Laboratoire Environnements, Dynamiques et Territoires de Montagne (EDYTEM), University Savoie Mont Blanc, Chambéry, France

Olivier Bastien: Labotatoire Physiologie Cellulaire et Végétale (LPCV), CEA, CNRS, INRA, Grenoble, France

Davide Batic: Mathematics Department, Khalifa University of Science and Technology, Abu Dhabi, UAE

Christian Beck: ISTerre, University Savoie Mont Blanc, Chambéry, France

Salmia Beddu: Department of Civil Engineering, Universiti Tenaga Nasional, Kajang, Malaysia

Joudy F. Beek: Mathematics Department, Khalifa University of Science and Technology, Abu Dhabi, UAE

Sonya Beisel: Institute of Computational Technologies, Novosibirsk, Russia

Rafik Belarbi: Laboratoire des Sciences de l'Ingénieur pour l'Environnement (LaSIE UMR 7356), Université de La Rochelle, La Rochelle, France

Julien Berger: Laboratoire des Sciences de l'Ingénieur pour l'Environnement (LaSIE UMR 7356), Université de La Rochelle, La Rochelle, France

Denis Blackmore: Department of Mathematical Sciences, New Jersey Institute of Technology, New Jersey, USA

Stéphanie Bolik: Labotatoire Physiologie Cellulaire et Végétale (LPCV), CEA, CNRS, INRA, Grenoble, France

Maximilien Bowen: Laboratoire Interuniversitaire de Biologie de la Motricité (LIBM), Université Savoie Mont Blanc, Chambéry, France

Didier Bresch: Laboratoire de Mathématiques (LAMA), Université Savoie Mont Blanc, Chambéry, France

Thomas Bueler-Faudree: Columbia University, New York, USA

Catherine Buhé: Laboratoire LOCIE UMR 5271, Polytech Annecy–Chambéry, Le Bourget-du-Lac, France

Thomas Busser: Département de Physique, ENS de Lyon, Lyon, France

Jean-Guy Caputo: Laboratoire de Mathématiques de l'INSA de Rouen, Rouen, France

Francesco Carbone: National Research Council — Institute of Atmospheric Pollution Research, C/o University of Calabria, Rende, Italy

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8.4 Editorial boards membership

- Journal of Ocean Engineering and Marine Energy
- Gulf Journal of Mathematics
- Geosciences
- Computational Technologies

8.5 Publications

- My Erdős number: **3**
- My $h-$index[4]: **40**
- My ORCID number: $0000 - 0001 - 5247 - 2788$
- Citations statistics:

https://scholar.google.com/citations?user=cvOVca4AAAAJ

8.5.1 Preprints under review

13. D. Batic, **D. Dutykh** and F. Scardigli. *Spectral Analysis of Quasinormal Modes of Planck Stars*. Submitted, 2025
12. A. Rashidi, **D. Dutykh** and M. Mokhtari. *Primarily tsunami modeling of the Mw 8.8 Kamchatka Peninsula earthquake on July 29, 2025*. Submitted, 2025
11. D. Batic, **D. Dutykh** and M. Sukaiti. *Noncommutative geometry–inspired wormholes supported by quasi-de Sitter and Chaplygin-like equations of state*. Submitted, 2025
10. D. Batic and **D. Dutykh**. *Gauss–Bonnet fingerprints in black-hole ringdowns*. Submitted, 2025
9. D. Batic and **D. Dutykh**. *Scalar Quasinormal Modes of Gauss–Bonnet Black Holes via the Spectral Method*. Submitted, 2025
8. D. Batic and **D. Dutykh**. *Vector Quasinormal Modes of Gauss–Bonnet Black Holes via the Spectral Method*. Submitted, 2025
7. D. Batic and **D. Dutykh**. *Tensor Quasinormal Modes of Gauss–Bonnet Black Holes via the Spectral Method*. Submitted, 2025
6. R. Escobedo, **D. Dutykh**, and L. Spector. *Group size effect on the success of wolves hunting*. Submitted, 2025
https://hal.archives-ouvertes.fr/hal-01182799/
5. M. Hunt and **D. Dutykh**. *Free Surface Waves in Electrohydrodynamics with Prescribed Vorticity Distribution*. Submitted, 2025
4. P. Kundu, S. Sarkar and **D. Dutykh**. *Analysis of the effect of interaction between non-planar and planar faults*, Submitted, 2024
3. R. Matar, N. Abcha, N. Lecoq, E. Turki, I. Abroug and **D. Dutykh**. *Exploring extreme wave propagation in coastal zones: A combined physical and numerical modeling study*. Submitted, 2024

[4]This information is retrieved from Google Scholar server.

2. A. Deeb, **D. Dutykh** and M. Al Zohbi. *Error estimation for numerical approximations of ODEs via composition techniques. Part II: Backward difference formulas.* Submitted, 2023

1. A. Deeb and **D. Dutykh**. *Error estimation for numerical approximations of ODEs via composition techniques. Part I: One-step methods.* Submitted, 2023

8.5.2 Books

5. D. Clamond, **D. Dutykh** and D. Mitsotakis. *Variational approach to water wave modelling*, IAHR WATER MONOGRAPHS, International Association for Hydro-Environment Engineering and Research (IAHR), Spain, 2024. ISBN: 978 – 90 – 833476 – 6 – 0
https://www.iahr.org/library/infor?pid=29802/

4. S. Lespinats, B. Colange and **D. Dutykh**. *Nonlinear Dimensionality Reduction Techniques: A Data Structure Preservation Approach*, Springer, 2022. ISBN: 978 – 3 – 030 – 81025 – 2
https://www.springer.com/gp/book/9783030810252/

3. G. Khakimzyanov, **D. Dutykh**, Z. Fedotova and O. Gusev. *Dispersive Shallow Water Waves: Theory, Modeling, and Numerical Methods*, 1st Ed., Birkhäuser Basel, Springer Nature Switzerland AG, 263 pp., 2020. ISBN: 978 – 3 – 030 – 46266 – 6
https://www.springer.com/gp/book/9783030462666/

2. N. Mendes, M. Chhay, J. Berger and **D. Dutykh**. *Numerical methods for diffusion phenomena in building physics: a practical introduction*, 2nd Ed., Springer, Cham, Switzerland, 251 pp., 2020. ISBN: 978 – 3 – 030 – 31573 – 3
https://www.springer.com/gp/book/9783030315733/

1. N. Mendes, M. Chhay, J. Berger and **D. Dutykh**. *Numerical methods for diffusion phenomena in building physics*, PUCPRESS, Curitiba, Brazil, 224 pp., 2017. ISBN: 978 – 8 – 568 – 32488 – 2
https://books.google.com/books?id=KNcuDwAAQBAJ

8.5.3 International peer-reviewed journals

– 2025 –

182. S. Mukherjee, L. Vuillon, **D. Dutykh** and I. Tsanakas. *Scalable weather data reduction for solar PV analysis using graph-based approach.* Accepted to Energy Systems, 2025
https://hal.science/hal-05235714/

181. M. Zafar, **D. Dutykh**, R. Paris, R. Gastineau, J. De Sigoyer, E. Duarte, N. Ünsal, N. Harrichhausen, S. Flavard, M. Şahin and P. Sabatier. *Strike-Slip Fault-Generated Paleotsunamis in Lake Iznik (NW Türkiye): Numerical Modeling Corroborated by*

Coastal Deposits. Geophys. Res. Lett., **52**(18), e2025GL117422, 2025
https://hal.science/hal-05293993/

180. D. Batic, **D. Dutykh**, and Z. Babou. *Quasinormal modes of noncommutative geometry-inspired dirty black holes*. Proc. R. Soc. A, **481**(2318), 20250021, 2025
https://arxiv.org/abs/2507.19107/

179. S. Savvopoulos, A. Al-Aghbari, K. El Kadi, **D. Dutykh** and I. Janajreh. *Advancing Freeze Desalination through Ultrasound-Enhanced Modelling: Case Studies and Insights for Commercial Applications*. Case Stud. Therm. Eng., **73**, 106518, 2025

178. M. Zafar, P. Sabatier, **D. Dutykh**, H. Jomard, W. Rapuc, P. Lajeunesse and E. Chapron. *Modelling earthquake-induced seiche process and subsequent homogenite deposits in lacustrine setting*. Earth Planet. Sci. Lett., **660**, 119348, 2025

177. D. Batic, **D. Dutykh** and J. Beek. *A Spectral Approach for Quasinormal Frequencies of Noncommutative Geometry-inspired Wormholes*. Class. Quantum Gravity, **42**(8), 085003, 2025
https://arxiv.org/abs/2504.02370/

176. M. Amazioug, J.-X. Peng, **D. Dutykh** and M. Asjad. *Emergence and enhancement of feedback control induced quantum entanglement*. Eur. Phys. J. Plus, **140**, 132, 2025
https://arxiv.org/abs/2311.06578/

175. A. Deeb and **D. Dutykh**. *Numerical integration of Navier–Stokes equations by time series expansion and stabilized FEM*, Math. Comput. Simul., **233**, 208–236, 2025
https://hal.science/hal-04932473/

174. D. Batic and **D. Dutykh**. *Instability Analysis of Massive Static Phantom Wormholes via the Spectral Method*. Eur. Phys. J. C, **85**, 144, 2025
https://arxiv.org/abs/2502.05486/

173. **D. Dutykh** and E. Leichtnam. *On complex algebraic singularities of some genuinely nonlinear PDEs*. Rend. Mat. Appl. (7), **46**(1-2), 63–150, 2025
https://hal.science/hal-03372673/

172. **D. Dutykh** and Ya. Prykarpatsky. *On integrability of a new dynamical system associated with the BBM-type hydrodynamic flow*, Math. Methods Appl. Sci., **48**(1), 107–121, 2025
https://arxiv.org/abs/2407.07900/

– 2024 –

171. A. Rashidi, M. Mokhtari, **D. Dutykh**, M. Masoodi, P. Faridi and S. Kiani. *Researching Tsunami Hazards in Makran: Insights into Challenges and Complex Tsunamis*. J. Seismol. Earthq. Eng., **26**(4), 71–85, 2024

170. D. Batic, **D. Dutykh** and B.L. Giacchini. *A unified spectral approach for quasinormal modes of Lee–Wick black holes*, Phys. Rev. D, **110**, 084032, 2024
https://arxiv.org/abs/2410.13245/

169. D. Batic and **D. Dutykh**. *A Unified Spectral Approach for Quasinormal Modes of Morris–Thorne Wormholes*. Class. Quantum Gravity, **41**(21), 215003, 2024
https://arxiv.org/abs/2410.05979/

168. P. Djorwé, M. Asjad, Y. Pennec, **D. Dutykh** and B. Djafari-Rouhani. *Parametrically enhancing sensor sensitivity at an exceptional point*. Phys. Rev. Res., **6**, 033284, 2024
https://arxiv.org/abs/2312.05057/

167. F. Carbone and **D. Dutykh**. *Route to chaos and resonant triads interaction in a truncated Rotating Nonlinear shallow-water model*, PLoS One, **19**(8), e0305534, 2024
https://hal.science/hal-04670019/

166. C. Edet, M. Asjad, **D. Dutykh**, N. Ali and O. Abah. *Entropy production rate and correlations of cavity magnomechanical system*. Phys. Rev. Res., **6**, 033037, 2024
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165. A. Deeb and **D. Dutykh**. *Stabilized Time Series Expansions for High-Order Finite Element Solutions of Partial Differential Equations*. Stud. Appl. Math., **153**(2), e12708, 2024
https://hal.science/hal-04582473/

164. C. Cárdenas-Bravo, **D. Dutykh** and S. Lespinats. *On the parameters domain of the single-diode model*, Solar Energy, **277**, 112718, 2024
https://hal.science/hal-04622649/

163. D. Batic and **D. Dutykh**. *Quasinormal Modes in Noncommutative Schwarzschild Black Holes: A Spectral Analysis*. Eur. Phys. J. C, **84**, 622, 2024
https://arxiv.org/abs/2406.03353/

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19. S. Rusconi, **D. Dutykh**, A. Zarnescu, D. Sokolovski and E. Akhmatskaya. *Population balance approach for predicting polymer particles morphology*. The 11th Conference on Dynamical Systems Applied to Biology and Natural Sciences (DSABNS), Trento, Italy, 4 – 7 February 2020. ISBN: 978 – 989 – 98750 – 7 – 4
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3. **D. Dutykh** and F. Dias. *Tsunami wave energy*, 4th Canadian Conference on Geohazards, Universit Laval, May 20 – 24, 7 p., 2008
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1. C. Kassiotis, F. Dias, A. Ibrahimbegovic and **D. Dutykh**, *A partitioned approach to model tsunami impact on coastal protections*, ECCOMAS Thematic Conference on Multi-scale Computational Methods for Solids and Fluids. A. Ibrahimbegovic, F. Dias, H. Matthies, P. Wriggers (eds.), 134–139, 2007

8.5.7 Research reports

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4. Ch. Lalanne, A. Rafiee, **D. Dutykh**, M. Lysaght and F. Dias. *Enabling the UCD–SPH code on the Xeon Phi*, 12 pp., 2014
http://hal.archives-ouvertes.fr/hal-00927227/

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3. F. Fedele and **D. Dutykh**. *Hamiltonian description and traveling waves of the spatial Dysthe equations*, 2011
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8.5.8 Book reviews

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https://hal.science/hal-04474814/

8.5.9 Theses

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1. **D. Dutykh**. *Harmonic oscillations of an inhomogeneous elastic layer* (in Ukrainian), Bachelor thesis, Faculty of Applied Mathematics, Oles Honchar National University, Dnepropetrovsk, Ukraine, 2003

8.5.10 Various writings

5. **D. Dutykh**. *How to overcome the Courant-Friedrichs-Lewy condition of explicit discretizations?*. Technical report, 20 pp, 2016
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4. **D. Dutykh**. *A brief introduction to pseudo-spectral methods: application to diffusion problems*. Lecture notes, 38 pp, 2016
https://cel.archives-ouvertes.fr/cel-01256472/

3. **D. Dutykh**. *Introduction into Hydrodynamics. Variational point of view*. Lecture notes (work in progress), 142 pp, 2015
https://github.com/dutykh/hydro/

2. **D. Dutykh**. *My favourite books, papers and software libraries*. Informal notes (work in progress), 18 pp, 2015
https://github.com/dutykh/libs/

1. **D. Dutykh**. *Mathematical exercises (with solutions)*. Work in progress, 40 pp, 2015
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8.5.11 General audience articles

14. ClassNeRV, une nouvelle méthode extrêmement efficace pour l'analyse de données, Le Fil d'Actualité de l'Université Savoie Mont Blanc, December 9, 2020

13. A dive into tsunami — the terrifying energy it possesses! Scrivial.com, 2015

12. C. Acary-Robert, D. Bresch and **D. Dutykh**. *Simulation d'avalanches de neige*. Actualités scientifiques de l'INSMI (CNRS), 14 mars 2012
http://www.cnrs.fr/insmi/spip.php?article441

11. C. Acary-Robert, **D. Dutykh** and M. Gisclon. *Un modello per simulare numericamente le valanghe di neve*. Translation by Roberto Natalini, 2011
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http://images.math.cnrs.fr/Une-approche-pour-simuler-des.html

9. *Tsunamis: gare aux "avalanches" et à la deuxième vague*. Le Monde, 1er Octobre 2011

8. *New research may explain high runup from tsunami waves*. PhysicsCentral, Blog of the American Physical Society. September, 19, 2011

7. *Tsunami Puzzle Explained*. Physical Review Focus, 16 September 2011
http://focus.aps.org/story/v28/st11

6. *Tuned into Earth*. CNRS International Magazine, **21**, April 2011

5. *Quelle est la différence entre un tsunami et un raz-de-marée?*, Slate.fr, 24 mars 2011 http://www.slate.fr/story/36093/difference-tsunami-raz-de-maree

4. *Les maths à l'écoute de la Terre*. Le Journal du CNRS, N° 245, juin 2010

3. *Simuler une avalanche*. La Recherche N428 – Avril 2009

2. *Springy sediments may amplify tsunamis*. Issue 2662 of New Scientist magazine, 25 June 2008, page 20

1. *Comment naît un tsunami?*, Le Mensuel de l'Université, N° 23, Février 2008

8.6 Special issues editor

- "*Ten Years after the 2011 Tohoku Tsunami: Social and Environmental Impacts, Lessons Learned, and New Perspectives*" at Geosciences (ISSN 2076 – 3263, MDPI). Co-editor: Dr. Amin Rashidi (Institute of Geophysics, University of Tehran, Iran). Submission deadline: the 31st of August 2021.
  https://www.mdpi.com/journal/geosciences/special_issues/2011_Tohoku_tsunami/

- "*Mathematical Modeling of Sediment Transport in Coastal Areas*" at Water (ISSN 2073-4441, MDPI). Submission deadline: the 31st of August 2021.
  https://www.mdpi.com/journal/water/special_issues/math_model_sediment_transport/

8.7 Referee activities

8.7.1 Mathematical databases

- MathSciNet
- Zentralblatt-MATH

8.7.2 International Journals

- Chaos, Solitons & Fractals
- Physical Review Letters
- Scientific Reports
- Journal of Fluid Mechanics
- Journal of Computational Physics
- Journal of Engineering Mathematics
- Theoretical and Computational Fluid Dynamics
- Journal of Nonlinear Science

- Journal of Hydraulic Research
- Journal of Applied Analysis
- Applied Ocean Research
- American Journal of Physics
- Journal de Mathématiques Pures et Appliquées
- Journal of Waterway, Port, Coastal, and Ocean Engineering
- Water Waves: An interdisciplinary journal
- Environmental Fluid Mechanics
- Acta Applicandae Mathematicae
- Applied Mathematical Modelling
- Applied Mathematics and Computation
- ESAIM: Mathematical Modelling and Numerical Analysis
- International Journal for Numerical Methods in Fluids
- Computer Physics Communications
- Computers and Mathematics with Applications
- Numerical Algorithms
- Communications in Nonlinear Science and Numerical Simulation
- Coastal Engineering
- AIMS Mathematics
- Communications on Pure and Applied Analysis
- Pure and Applied Geophysics
- Comptes Rendus Mécanique
- European Journal of Mechanics - B/Fluids
- Mathematics and Computers in Simulation
- Mathematical Notes
- Numerische Mathematik
- Ocean Engineering

- Partial Differential Equations in Applied Mathematics
- Ocean Modelling
- Journal of Ocean Engineering and Marine Energy
- Journal of Building Performance Simulation
- Physica D: Nonlinear Phenomena
- Physics Letters A
- SIAM Journal on Applied Mathematics
- Solar Energy
- Wave Motion
- Marine Pollution Bulletin
- Mathematical and Computational Applications
- Mathematical Methods in the Applied Sciences
- Atmosphere
- Geosciences
- Geohazards
- Oceans
- Optik
- Natural Hazards and Earth System Sciences
- Networks and Heterogeneous Media
- Building and Environment
- Earth, Planets and Space (EPS)
- ICE — Engineering and Computational Mechanics
- Journal of Advanced Chemical Engineering
- KSCE Journal of Civil Engineering
- Fundamental and Applied Hydrophysics
- Symmetry
- Kuwait Journal of Science & Engineering

- Zeitschrift für Naturforschung A
- Rendiconti del Circolo Matematico di Palermo
- Open Engineering
- Journal of Ocean Engineering and Science
- Polarforschung
- Nonlinear Dynamics
- Qualitative Theory of Dynamical Systems
- Journal of Marine Science and Engineering
- International Journal of Theoretical Physics
- Ocean Dynamics
- Mathematical and Computational Applications
- Biomimetics
- Frontiers in Physics
- Gulf Journal of Mathematics
- Frontiers in Plant Science
- Algorithms
- Drones
- Fractal and Fractional
- Mathematics
- Electronics
- Energies
- Plants
- Sustainability
- Technologies
- Fire
- Prevention and Treatment of Natural Disasters
- Metascience in Aerospace

- AgriEngineering
- Agronomy
- Applied Sciences
- Computers in Industry
- Results in Physics
- Environmental Research
- Journal of Environmental & Earth Sciences
- World Electric Vehicle Journal

8.7.3 International Conferences

- FVCA VII
- FVCA VI
- ISOPE 2010
- ICTAM 2008
- ISOPE 2007
- FVCA V

8.7.4 Book proposals

- Springer Science

8.7.5 Calls for proposals

- Expert for Crédit d'Impôt Recherche (CIR) in the field Engineering Mathematics (A4b3) at Ministère de l'Enseignement Supérieur et de la Recherche (MESR), France
- KU Leuven Industrial Research Fund Council
- Irish Research Council
- Israel Science Foundation
- KAUST Research Proposals
- Marie Curie COFUND
- Cluster Environnement Rhône-Alpes (Projet 2: Risques gravitaires, séismes)
- Service de coopération universitaire et scientifique, Ambassade de France en Ukraine

- Swiss National Science Foundation
- Oregon Sea Grant

8.8 Delivered talks

Most of the presentation slides can be downloaded from my home page:
http://www.denys-dutykh.com/talks.php

8.8.1 International conferences

- *Nonlinear dispersive wave propagation on planetary scales*, The Third Eurasian Risk Conference And Symposium, 7 – 9 December, 2021, Tbilisi, Georgia
- *On shallow capillary-gravity waves*, International Conference on Scientific Computation And Differential Equations (SciCADE–2015), 14 – 18 September, 2015, Potsdam, Germany
- *Fully nonlinear weakly dispersive travelling capillary–gravity waves*, 12$^{\text{e}}$ Colloque Franco-Roumain de Mathématiques Appliquées, 25 – 30 August 2014, Lyon, France
- *Fast and accurate computation of solitary waves of the free surface Euler equations*, 16 – 20 September 2013, International Conference on Scientific Computation and Differential Equations (SciCADE), Valladolid, Spain
- *Extreme wave run-up on a vertical cliff*, 5 – 8 September 2013, Mathematical and Informational Technologies (MIT), Vrnjacka Banja, Serbia
- *Fast and accurate computation of gravity solitary waves*, 25 – 28 March 2013. The Eighth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory. Athens (GA), USA
- *Relaxed Variational Principle for Water Wave Modeling*, June 13 – 16, 2012. SIAM Conference on Nonlinear Waves and Coherent Structures. The University of Washington, Seattle, USA
- *Dispersive wave runup and some related amplification phenomena*, 27 – 31 August 2011, International Conference "Mathematical and Informational Technologies", MIT-2011, Vrnjacka Banja, Serbia
- *Finite volume schemes for dispersive wave equations*, Numerical Methods for Hyperbolic Equations: Theory and Applications. International Conference to honour Professor E.F. Toro in the month of his 65th birthday, Santiago de Compostela, Spain, July 4 – 8, 2011
- *Dispersive wave runup on non-uniform shores*, Finite Volumes for Complex Applications VI, Prague, Czech Republic, June 6 – 10, 2011

- *Numerical simulation of a dispersive wave runup*, 4 – 7 April 2011, The Seventh IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, Georgia, USA

- *Modeling and simulation of compressible two-phase flows*, 17th September 2010, NumAn 2010 Conference in Numerical Analysis, Crete, Greece

- *Tsunami wave modeling*, 6 April 2010, "Exploring structural controls on great earthquake rupture and architecture of the Sunda/Sumatran convergent margin: international collaboration, links to tsunami modeling and planning of future research activities", Fondation des Treilles, France

- *Visco potential free-surface flows*, XXII International Congress of Theoretical and Applied Mechanics, Adelaide, Australia, 24–30 August 2008

- *Tsunami wave energy*, SIAM Conference on Nonlinear Waves and Coherent Structures (NW08), Universit di Roma "La Sapienza", Rome, Italy, July 21–24, 2008

- *Simulation of Free Surface Compressible Flows Via a Two Fluid Model*, The 27th International Conference on OFFSHORE MECHANICS AND ARCTIC ENGINEERING (OMAE 2008), Estoril, Portugal, 15 – 20 June, 2008

- *Simulation of free surface motions via a two fluid model*, International conference "Trends in Numerical and Physical Modeling for Industrial Multiphase Flows", September 17 – 21, 2007, Cargèse, Corsica, France

- *On the generation of tsunamis by earthquakes*, The Fifth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, GA, USA, April 16 – 19, 2007

- *Tsunami generation*, SIAM Conference on Nonlinear Waves and Coherent Structures, September 9 – 12, 2006, University of Washington, Seattle, Washington

8.8.2 Workshops

- *Nonlinear waves in $Y-$junctions*, the 5^{th} of July 2022, Nonlinear waves and networks (ONL2022), the 60^{th} Birthday of Jean-Guy Caputo, INSA de Rouen, Rouen, France

- *On a supraconvergence phenomenon in finite difference schemes*, the 21^{st} of December 2021, The Sixth International Talent Forum of Mathematical Sciences, (virtually) Nankai University, Tianjin, China

- *Nonlinear dispersive wave propagation on planetary scales*, the 8^{th} of December 2021, Modèles asymptotiques et méthodes numériques pour les milieux continus et la biologie, Saint-Étienne, France

- *Water waves without tears*, 19 – 29 August 2019, Geometrical methods in nonlinear PDEs and critical phenomena, Wisla, Poland

- *Energy-consistent shallow water models derivation with improved dispersion relation*, 16 – 17 May 2016, French–Spanish Workshop on Evolution Problems (FSWEP16), Valladolid, Spain

- *Modelling of shallow dispersive water waves*, 14 – 20 June 2015, Numerical approximations of hyperbolic systems with source terms and applications (NumHyp–2015), Cortona, Italy

- *Application of variational principles to water wave modelling*, 2 – 4 July 2014, 16$^{\text{th}}$ RIMS Workshop "Mathematical Analysis in Fluid and Gas Dynamics", RIMS, Kyoto University, Kyoto, Japan

- *Capillary–gravity waves in nonlinear shallow water and full Euler equations*, 23 – 26 April 2014, Wave Interaction (WIN–2014), Linz, Austria

- *Wave propagation over rapidly varying bottoms. Excursion into variational methods*, 9 – 11 April 2014, Mathematical Modelling for Tsunami Early Warning Systems, Málaga, Spain

- *Relaxed variational principle for water wave modeling*, 6 – 10 May 2013, Workshop on Ocean Wave Dynamics, Fields Institute, Toronto, Canada

- *Extreme wave run-up on a vertical cliff*, 14 – 18 April 2013, IUTAM Symposium 2013: Nonlinear interfacial wave phenomena from the micro to the macro-scale, Limassol, Cyprus

- *The emergence of coherent wave groups in deep-water random sea*, 14 – 18 April 2013, IUTAM Symposium 2013: Nonlinear interfacial wave phenomena from the micro to the macro-scale, Limassol, Cyprus

- *Extreme wave run-up on a vertical cliff*. 2$^{\text{nd}}$ ERC MULTIWAVE Workshop, 22 March 2013, University College Dublin, Ireland

- *Modified shallow water equations for large bathymetry variations*, 8 – 13 October 2012, "Mathematical modeling and analysis of extreme sea waves" Fondation des Treilles, Tourtour, France

- *Dispersive and non-dispersive wave runup and some related phenomena*, "The Mathematics of Extreme Sea Waves: Tsunamis, Rogue Waves, And Flooding" held at Fields Institute, Toronto, June 13 – 16, 2011

- *Modeling of tsunami wave generation*, 21st September 2010, Summer school and workshop on "Numerical Methods for interactions between sediments and water", Paris 13 University, France

- *A generalized variational principle for water wave modeling*, 11 December 2009, Hydrodynamique des lacs et approximation de Saint-Venant, Institut Jean le Rond d'Alembert, Université Pierre et Marie Curie (Paris 6), Paris, France

- *Powder-snow avalanche flow modelling*, 12 – 16 October 2009, 4th Russian-German Advanced Research Workshop, Freiburg, Germany
- *Tsunami wave energy*, 22 September 2009, Session "Numerical methods for complex fluid flows", Wolfgang Pauli Institute, Vienna, Austria
- *Numerical simulation of tsunami waves. Presentation of VOLNA code.* 27 January 2009, Océanographie et Mathématiques, Ecole Normale Supérieure, Paris, France
- *Influence of the mud layer on sea-bed deformations*, 2nd FORTH Workshop on Tsunami generation, 12 and 13 February, 2008, Heraklion, Crete (Greece)
- *On the dynamic generation of tsunamis by a moving bottom*, TRANSFER Workshop "Numerical Models, Inundation Maps and Test Sites", June 12 – 14, 2007, Fethiye, Turkey
- *Derivation and numerical resolution of long wave equations*, Wolfgang Pauli Institute, Vienna, Working session "Dispersive nonlinear longwave PDE's and applications in physics" organized by Jean-Claude Saut, 21 – 25 May 2007
- Conference "*Results of the Sumatra Earthquake and Tsunami Offshore Survey 2005*", October 19 – 24, 2005, Fondation des Treilles

8.8.3 National conferences

- *Numerical simulation of dispersive waves*, the 29$^{\text{th}}$ October 2010, Colloque EDP Normandie, University of Caen, Caen, France
- *Simulation numérique dans l'hydrodynamique côtière*, 39e Congrès National d'Analyse Numérique (CANUM 2008), 26 – 30 of May 2008, Vendée, France

8.8.4 Participation in summer schools

- Summer school Wisla–19 "*Differential Geometry, Differential Equations, and Mathematical Physics*", 19 – 29 August 2019, Wisla, Poland
  http://www.baltinmat.com/summer-school-workshop-wisla-19/
- XXII Summer Diffiety School on the Geometry of PDEs, 20 – 28 July 2019, Lizzano-in-Belvedere, Italy
  https://sites.google.com/site/levicivitainstitute/Activities/DiffietySchools/xxii-summer-diffiety-school/
- Summer school Zetas–2018: "*Zeta functions, polyzeta functions, arithmetical series: applications to motives and number theory*", 18 – 29 of June 2018, University Savoie Mont Blanc, Le Bourget-du-Lac, France
  https://etzetas2018.sciencesconf.org/

- XXI Summer Diffiety School on the Geometry of PDEs, 19 – 31 July 2018, Lizzano-in-Belvedere, Italy
  https://sites.google.com/site/levicivitainstitute/Activities/DiffietySchools/xxi-summer-diffiety-school/

8.8.5 Seminars

- *Implicit ODEs and capillary-gravity solitary waves*, the 24$^{\text{th}}$ of October 2024, Mathematics Seminar, Mathematics Department, Khalifa University of Science and Technology, Abu Dhabi, UAE
- *A Hamiltonian regularization of shallow water waves*, the 24$^{\text{th}}$ of January 2024, Mathematics Seminar, Mathematics Department, Khalifa University of Science and Technology, Abu Dhabi, UAE
- *A gentle introduction to the water wave problem*, the 6$^{\text{th}}$ of October 2022, CoSMiC Seminar, Mathematics Department, Khalifa University of Science and Technology, Abu Dhabi, UAE
- *A Hamiltonian regularization of shallow water waves*, the 7$^{\text{th}}$ of May 2021, Applied Mathematics virtual Seminar, Mathematics Institute, The University of Warwick, UK
- *A Hamiltonian regularization of shallow water waves*, the 12$^{\text{th}}$ of March 2021, Virtual Seminar of the team $\mathcal{A}^3$, LAMFA UMR 7352, Université de Picardie Jules Verne, Amiens, France
- *A Hamiltonian regularization of shallow water waves*, the 9$^{\text{th}}$ of March 2021, Virtual Seminar of Information and Computational Technologies, ICT SB RAS, Novosibirsk, Russia
- *A Hamiltonian regularization of shallow water waves*, the 4$^{\text{th}}$ of March 2021, Virtual Seminar of the PDEs team, LMA UMR 7348, University of Poitiers, Poitiers, France
- *Computation of solitary wave solutions*, the 3$^{\text{rd}}$ December 2019, Seminar at M2C UMR 6143, Morphodynamique Continentale et Côtière, Université Caen Normandie, Caen, France
- *Nonlinear dispersive water wave modelling: mastering the dispersion*, 18 November 2019, Seminar of the team $\mathcal{A}^3$, LAMFA UMR 7352, Université de Picardie Jules Verne, Amiens, France
- *Nonlinear dispersive water wave modelling. Part 2: mastering the dispersion*, the 27$^{\text{th}}$ of September 2019, EDF R&D Center & Saint-Venant Hydraulics Laboratory, Chatou, France
- *Nonlinear dispersive water wave modelling. Part 1: the variational approach*, the 26$^{\text{th}}$ of September 2019, EDF R&D Center & Saint-Venant Hydraulics Laboratory, Chatou, France

- *Variational approach to water wave modelling*, 2 November 2017, Marine Systems Institute seminar, Tallinn University of Technology, Estonia
- *Water waves without tears*, 11 May 2017, Colloquium of Mathematics, Laboratoire de Mathématiques Raphaël Salem, Université de Rouen, France
- *Water waves without tears*, 16 March 2017, Colloquium of Mathematics and Statistics, Victoria University of Wellington, Wellington, New Zealand
- *On the complete classification of shallow travelling capillary-gravity solitary waves*, 14 November 2016, Seminar of the team $\mathcal{A}^3$, LAMFA UMR 7352, Université de Picardie Jules Verne, Amiens, France
- *On the complete classification of shallow travelling capillary-gravity solitary waves*, 10 November 2016, Groupe de Discussions, LAMA UMR 5127, Université Savoie Mont Blanc, France
- *Numerical methods on moving grids: une histoire de* $\mathcal{Q}$, 18 February 2016, Groupe de Discussions, LAMA UMR 5127, Université Savoie Mont Blanc, France
- *Computation of travelling wave solutions*, 20 May 2015, Groupe de Discussions, LAMA UMR 5127, Université Savoie Mont Blanc, France
- *Families of steady fully nonlinear shallow capillary-gravity waves*, NUMERIWAVES Seminar, 25 February 2015, Basque Center for Applied Mathematics (BCAM), Bilbao, Spain
- *Families of shallow capillary-gravity waves*, GIR Análisis Numérico de Problemas de Evolución, 20 February 2015, Instituto de Matemáticas imUVa, Universidad de Valladolid, Spain
- *Relaxed variational principle for water wave modeling*, Kolloquium Angewandte Mathematik, Friedrich-Alexander Universität Erlangen-Nürnberg, 13 November 2014, Erlangen, Germany
- *Resonant wave run-up on sloping beaches and vertical walls*, Seminar: Conservation Laws and Invariants of PDEs of Hydrodynamic type (16h00), 24 October 2014, Institute of Computational Technologies SB RAS, Novosibirsk, Russia
- *Relaxed variational principle for water wave modelling*, Seminar: Conservation Laws and Invariants of PDEs of Hydrodynamic type (11h00), 24 October 2014, Institute of Computational Technologies SB RAS, Novosibirsk, Russia
- *Relaxed variational principle for water wave modelling*, Seminar of the Laboratory of Differential equations, 23 October 2014, Lavrentyev Institute of Hydrodynamics SB RAS, Novosibirsk, Russia
- *Algebraic geometry for shallow capillary-gravity waves*, Seminar: Computational Technologies, 21 October 2014, Institute of Computational Technologies SB RAS, Novosibirsk, Russia

- *Fully nonlinear weakly dispersive capillary-gravity waves*, 8 July 2014, Department of Mathematics, Keio University, Japan
- *Some resonance phenomena during the wave run-up*, 23 January 2013, Department of Applied Mathematics, University of Sevilla, Spain
- *A Variational Approach for Water Wave Modelling*, 18 January 2013, NUMERI-WAVES Group Seminar, Basque Center for Applied Mathematics (BCAM), Bilbao, Spain
- *Some critical comments on the landslides modelling*, 26 October 2012, Wave Group Seminar, School of Mathematical Sciences, University College Dublin, Ireland
- *Relaxed variational principle for water wave modeling*, May, 25, 2012. Wave Group Seminar, School of Mathematical Sciences, University College Dublin, Ireland
- *Wave run-up on random and deterministic beaches*, April, 16, 2012. Mathematical Physics Seminar, School of Mathematics, Georgia Institute of Technology, Atlanta, GA, USA
- *Wave run-up on random and deterministic beaches*, March, 2, 2012. Basque Center for Applied Mathematics (BCAM), Bilbao, Spain
- *Relaxed variational principle for water wave modeling*, February, 7, 2012. imUVA Seminario, Universidad de Valladolid, Spain
- *Dissipative and resonant effects during the wave runup process*, February, 2, 2012. Séminaire d'Analyse Numérique et de Calcul Scientifique, Laboratoire de Mathématiques de Besançon, Université de Franche-Comté, France
- *Dissipative and resonant effects during a wave run-up*, October, 20, 2011. Fluid Mechanics Seminar, Department of Mathematics, University of Bergen, Norway
- *Relaxed variational principle for water wave modeling*, 14 October 2011, Seminar in Nonlinear Waves, Department of Mathematics, University of Bergen, Norway
- *Dispersive and non-dispersive wave runup on complex beaches*, 12 July 2011, Seminar of the Applied Mathematics Department, University of Valladolid, Valladolid, Spain
- *Mathematical modeling and numerical simulation of long water waves*, 21 March 2011, Séminaire d'Analyse Appliquée, LATP, Marseille, France
- *Relaxed variational principle for water wave modeling*, 13th March 2011, Séminaire d'analyse appliquée A^3, Laboratoire Amiénois de Mathématique Fondamentale et Appliquée, Amiens, France
- *Mathematical modelling of tsunami wave generation*, 12 November 2009, Institut Jean le Rond d'Alembert, Université Pierre et Marie Curie (Paris 6), Paris, France

- *Numerical simulation of powder snow avalanches.* 26 March 2009, Atelier VOR, Laboratoire 3S-R, Grenoble, France
- *Simulation of free surface compressible flows via a two fluid model*, 27 October 2008, Séminaire et Groupe de travail de Modélisation Mathématique, Mécanique et Numérique (M3N), Laboratoire de Mathématiques Nicolas Oresme, Université de Caen, Caen, France
- *Mathematical modelling of tsunami waves*, 23 October 2008, Séminaire EDP-MOISE, Laboratoire Jean Kuntzmann, Grenoble, France
- *Simulation of free surface compressible flows via a two fluid model*, 20 October 2008, Rencontres Niçoises de la Mécanique des Fluides, Laboratoire J.A. Dieudonné, Nice, France
- *Mathematical modelling of tsunami generation*, LAMA, Université de Savoie, 10 October 2008, Le Bourget-du-Lac, France
- *Numerical modelling of tsunami waves. VOLNA code presentation*, LAMA, Université de Savoie, 4th July 2008, Le Bourget-du-Lac, France
- *A two-fluid model for violent aerated flows*, LAMA, Université de Savoie, April, 24, 2008, Le Bourget-du-Lac, France
- *A two-fluid model for violent aerated flows*, Groupe de Travail Numérique, Université d'Orsay Paris-Sud, April, 16, 2008, Orsay, France
- *Simulation numérique des écoulements à surface libre*, Institut de Mécanique des Fluides de Toulouse, April, 11, 2008, Toulouse, France
- *Numerical modelling of tsunami generation and runup*, Groupe de Travail Mécanique des Fluides Réels, 18 February 2008, CMLA, ENS de Cachan, France
- *Simulation d'écoulements compressibles avec surface libre par un modèle bifluide*, CLAROM - Séminaire hydrodynamique et océano-météo, 29 novembre 2007, Institut Français du Pétrole
- *Viscous shallow water equations: potential approach and numerical methods*, 13 mars 2007, Institut de Mathématiques de Bordeaux, Groupe de travail Océanographie
- *Unstructured Finite Volume solver for dissipative shallow-water equations*, 12 février 2007, CMLA, ENS de Cachan, Groupe de travail mécanique des fluides réels
- *Génération des tsunamis*, Inauguration de LRC CMLA/CEA, 19 juin 2006

8.8.6 Short courses

April 2016: Short course (8h) on Spectral methods at the PhD School on Numerical Methods for Diffusion Phenomena, Pontifical Catholic University of Parana, Curitiba, Brazil

- Lecture notes: https://cel.archives-ouvertes.fr/cel-01256472/

April 2015: Short course (8h of Lectures) on "*A short introduction to Fluid Dynamics*", Basque Center for Applied Mathematics (BCAM). Course programme:

1. Review of (exterior) vector calculus
2. Eulerian description of fluid flows
3. Lagrangian description of fluids
4. Smoothed Particle Hydrodynamics

- Lecture notes: https://github.com/dutykh/hydro/

December 2014: Short course (20h of Lectures + 15h of TDs) on "*Lagrangian and Eulerian approaches to water wave modelling*", Faculty of Mechanics and Mathematics, Al-Farabi Kazakh National University, Almaty, Kazakhstan.

- Lecture notes: https://github.com/dutykh/hydro/

May 2013: *Numerical methods for fully nonlinear free surface water waves* (in collaboration with Dr. Claudio Viotti), 15 – 16 May 2013, Fields Institute, Thematic Program on the Mathematics of Oceans, Toronto, Canada
http://cel.archives-ouvertes.fr/cel-00825492/

8.8.7 Posters

6. S. Mustatea, S. Bolik, A. Amato, **D. Dutykh**, J. Jouhet, S. Lespinats and O. Bastien. *Phylogeny and sequence space: a combined approach to analyze the evolutionary trajectories of homologous proteins. The case study of Betain Lipid*, Poster presented at the (on site) International Symposia on Plant Lipids (ISPL 2022), Grenoble, France
https://ispl2020.sciencesconf.org/

5. A. Abdalazeez, I. Didenkulova, A. Kurkin, A. Rodin and **D. Dutykh**. *Runup of long waves on composite coastal slopes: numerical simulations and experiment*, Poster presented at the (virtual) EGU General Assembly, 6 May 2020, Vienna, Austria
https://www.researchgate.net/publication/341205844_Runup_of_long_waves_on_composite_coastal_slopes_numerical_simulations_and_experiment

4. A. Abdalazeez, I. Didenkulova, **D. Dutykh** and C. Labart. *Run-up of narrow and wide-banded irregular waves on a beach*, Poster presented at the (virtual) EGU General Assembly, 4 May 2020, Vienna, Austria
https://www.researchgate.net/publication/341175353_Run-up_of_narrow_and_wide-banded_irregular_waves_on_a_beach

3. A. Abdalazeez, I. Didenkulova and **D. Dutykh**. *Steepening and Run-up of Long Single Waves of Positive Polarity*, Poster presented at the Fourteenth International MEDCOAST Congress on Coastal and Marine Sciences, Engineering, Management and Conservation, 21 – 26 October 2019, Marmaris, Turkey
https://www.researchgate.net/publication/336482076_Steepening_and_Run-up_of_Long_Single_Waves_of_Positive_Polarity

2. A. Abdalazeez, T. Torsvik, **D. Dutykh**, P. Denissenko and I. Didenkulova. *Dispersive effects during long wave run-up on a beach*, Poster presented at EGU General Assembly, 7 – 12 April 2019, Vienna, Austria
https://www.researchgate.net/publication/332269054_Dispersive_effects_during_long_wave_run-up_on_a_beach

1. A. Abdalazeez, I. Didenkulova and **D. Dutykh**. *Nonlinear deformation and run-up of long single waves of positive polarity: numerical simulations and analytical predictions*, Poster presented at EGU General Assembly, 7 – 12 April 2019, Vienna, Austria
https://www.researchgate.net/publication/332268913_Nonlinear_deformation_and_run-up_of_long_single_waves_of_positive_polarity_numerical_simulations_and_analytical_predictions

8.8.8 General audience lectures

- *Astonishing Mathematics*. CMI students seminar at the University Savoie Mont Blanc, 12 December 2019, Le Bourget-du-Lac, France

- *Tsunamis: du terrain au modèle numérique*. General audience lecture with Professor Christian Beck (LGCA, University of Savoie) in the framework of the *Fête de la Science*, 21 November 2009, Cinéma Curial, Chambéry, France

- *What is applied mathematics?* Talk given for the general audience at École Normale Supérieure de Cachan, April, 27, 2007

- *Tsunami waves*. Talk given for the general audience at École Normale Supérieure de Cachan, December, 5, 2006

8.9 Software development

- Public `GitHub` repository, which contains most of the codes mentioned hereinbelow:
https://github.com/dutykh/

- Responding to the need of a growing community of students and researchers who wants to get involved in the field of electrochemical storage systems, NEOLAB offers a new tool dedicated to a modeling domain where almost no open-source solutions exist. Physics-based models of batteries require extensive knowledge in thermodynamics, electro-chemistry, mathematics, material and computer sciences. Based on the idea that a minimum working example is the best way to learn gradually how to model a battery, NEOLAB provides a solution to simulate the behavior of the negative

electrode of lead-acid batteries and a framework to investigate other primary and secondary technologies.

  – https://github.com/dutykh/NEOLAB/

Useful reference:

  – M. Cugnet, F. Gallois, A. Kirchev and **D. Dutykh**. *NEOLAB: A Scilab tool to simulate the Negative Electrode of Lead-Acid Batteries*. SoftwareX, **22**, 101394, 2023

- The following repository contains a Fourier-type pseudo-spectral solver for the Dysthe–Lo–Mei equation as described in Equations (2.6) – (2.9) in Lo & Mei (JFM, 1985) paper mentioned below. A very high order Runge–Kutta scheme is used for time integration with the adaptive time stepping. We employ also the integrating factor technique to slightly remove the stiffness of second order derivatives. The work of this code is illustrated on a simple evolution of the ground state to the low order underlying NLS equation.

  – https://github.com/dutykh/DystheEq/

  Useful references:

  – E. Lo and C.C. Mei. *A numerical study of water-wave modulation based on a higher-order nonlinear Schrödinger equation*, J. Fluid Mech., **150**, 395–416, 1985
  – F. Fedele and **D. Dutykh**. *Hamiltonian form and solitary waves of the spatial Dysthe equations*. JETP Letters, **94**(12), 921–925, 2011 http://hal.archives-ouvertes.fr/hal-00633389/
  – F. Fedele and **D. Dutykh**. *Hamiltonian description and traveling waves of the spatial Dysthe equations*, 2011 http://hal.archives-ouvertes.fr/hal-00632862/

- This Matlab code computes irrotational 2D periodic steady surface pure gravity waves of arbitrary length in arbitrary depth. The formulation is based on the so-called Babenko equation and pseudo-spectral discretization in the conformal domain. The resulting equation is solved using Petviashvili iteration method.

  – https://github.com/dutykh/SSGW/

  Useful reference:

  – D. Clamond and **D. Dutykh**. *Accurate fast computation of steady two-dimensional surface gravity waves in arbitrary depth*. J. Fluid Mech., **844**, 491–518, 2018 https://hal.archives-ouvertes.fr/hal-01465813/

- This Matlab code solves the classical nonlinear sine-Gordon equation on graphs using a symplectic Euler scheme in time

  – https://github.com/dutykh/sineGordonGraph/

  Useful reference:

  – **D. Dutykh** and J.-G. Caputo. *Discrete sine-Gordon dynamics on networks*, Submitted, 2016
  https://hal.archives-ouvertes.fr/hal-01160840/

- A simple Matlab code, which solves numerically 2D Navier–Stokes equations in vorticity formulation using a Fourier-type pseudo-spectral method

  – https://github.com/dutykh/NavierStokes2D/

- The present Matlab code is an implementation of the full Euler equations solver based on the method of conformal variables. The peculiarity here is that the solver works on general (but smooth) bottoms. The method is described in the reference given below. In a few words it is a Fourier-type pseudo-spectral solver. Standard Matlab time stepper is used to advance the solution in time. The solution is expected to be spectrally accurate

  – https://github.com/dutykh/Euler_bottom/

  Useful reference:

  – C. Viotti, **D. Dutykh** and F. Dias. *The conformal-mapping method for surface gravity waves in the presence of variable bathymetry and mean current*, Procedia IUTAM, **11**, 110–118, 2014
  http://hal.archives-ouvertes.fr/hal-00855780/

- This function computes the steady irrotational surface solitary (classical and generalized) capillary-gravity wave solutions of the full Euler equations (homogeneous, incompressible and perfect fluids). The full Euler system is recast under the form of the Babenko equation using the conformal mapping technique. The wave is defined by its initial Froude and Bond numbers (Fr, Bo) and the result is about twelve digits accurate. The method works for all but the highest waves.

  – https://github.com/dutykh/BabenkoCG/

  Useful reference:

  – **D. Dutykh**, D. Clamond and A. Durán. *Efficient computation of capillary-gravity generalized solitary waves*, Wave Motion, **65**, 1–16, 2016
  https://hal.archives-ouvertes.fr/hal-01218989/

- Fourier-type pseudo-spectral solver of the full Euler equations with the free surface on a fluid layer of infinite depth. The time-dependent fluid domain is transformed into a strip using the conformal mapping technique. Time discretization is done using the embedded Cash-Karp method of the order 5(4). The time integration is improved using the integrating factor technique (i.e. exact integration of linear terms). The solver is initialized to simulate the celebrated Peregrine breather evolution in the full Euler.

  – https://github.com/dutykh/ConformalEulerDeepWater/

- `SerreGravityWave.m`: This Matlab script is a pseudo-spectral solver for the Serre-Green-Naghdi equations which model the propagation of long gravity waves. Here, for the sake of simplicity, we restrict our attention to the case of the flat bottom. The numerical scheme is described in the following publication:

  – **D. Dutykh**, D. Clamond, P. Milewski and D. Mitsotakis. *Finite volume and pseudo-spectral schemes for the fully nonlinear 1D Serre equations*, European Journal of Applied Mathematics, **24**(5), 761–787, 2013
  http://hal.archives-ouvertes.fr/hal-00587994/

  – https://github.com/dutykh/SerreGravityWave/

- `sG_solver.epd`: This script allows to solve numerically the sine-Gordon equation in a Y–junction geometry using the Finite Element Method (FEM). The scheme is of 2^{nd} order in space and time. The implixit-explicit time stepping method is of the Crank–Nicolson type and it possesses excellent energy conservation properties.

  – https://github.com/dutykh/sineGordon_FreeFem/

- Participation in the PRACE DECI-9 project "*High-end computational modelling of wave energy converters*" (1^{st} November 2012 - 31 December 2013). The final report is available at:

  – Ch. Lalanne, A. Rafiee, **D. Dutykh**, M. Lysaght, F. Dias. *Enabling the UCD-SPH code on the Xeon Phi*, 2014
  http://hal.archives-ouvertes.fr/hal-00927227/

- `SolitaryWave.m`: this script computes in ultra-fast way and potentially to the arbitrary accuracy the solitary waves to the full free-surface Euler equations. The method is based on the conformal map technique and the Petviashvili iteration. Some more technical details and numerical results can be found in the following papers:

  – D. Clamond and **D. Dutykh**. *Fast accurate computation of the fully nonlinear solitary surface gravity waves*. Computers & Fluids, **84**, 35–38, 2013
  http://hal.archives-ouvertes.fr/hal-00759812/

  - **D. Dutykh** and D. Clamond. *Efficient computation of steady solitary gravity waves*. Wave Motion, **51**, 86–99, 2014
    http://hal.archives-ouvertes.fr/hal-00786077/

  - https://github.com/dutykh/BabenkoSolitaryWave/

  www.mathworks.com/matlabcentral/fileexchange/39189-solitary-water-wave/

- `OkadaSol.m`: this script computes co-seismic displacements according to the classical Okada solution. For more details you can have a look at the original Okada (1985) paper or this freely available my publication:

  - **D. Dutykh**, F. Dias, *Water waves generated by a moving bottom*. In Book:"Tsunami and Nonlinear Waves", Kundu, A. (Editor), Springer Verlag 2007, Approx. 325 p., 170 illus., Hardcover, ISBN: 978-3-540-71255-8
    http://hal.archives-ouvertes.fr/hal-00115875/

  - https://github.com/dutykh/Okada/

  http://www.mathworks.com/matlabcentral/fileexchange/39819

- **VOLNA**: a finite volume code on triangular unstructured meshes for the simulation of the generation, propagation and runup of tsunami waves. Developed in collaboration with Raphaël Poncet and Frédéric Dias. Currently this code is maintained by Irish Centre for High-End Computing (ICHEC) and School of Mathematical Sciences, University College Dublin. The code is described and validation tests are given in this article:

  - **D. Dutykh**, R. Poncet, F. Dias. *The VOLNA code for the numerical modelling of tsunami waves: generation, propagation and inundation*. European Journal of Mechanics B/Fluids, **30**(6), 598–615, 2011
    http://hal.archives-ouvertes.fr/hal-00454591/

8.10 Scientific meetings organization

- Scientific Committee member of the 5$^{\text{th}}$ International Conference on Structural and Physical Aspects of Construction Engineering (SPACE-2022), 12 – 14 October 2022, Kosice, Slovakia
  https://space.uis.svf.tuke.sk/

- Scientific Committee member of the Civil Engineering Conference, 9 – 10 February 2022, Kosice, Slovakia
  https://cec.svf.tuke.sk/

- Program Committee member of the "2$^{\text{nd}}$ International Workshop on Advanced Information and Computation Technologies and Systems" (AICTS 2021), December 6 – 10 2021, Irkutsk, Russia
  https://aicts.icc.ru/

- Program committee member of the "3rd International Workshop on Information, Computation, and Control Systems for Distributed Environments" (ICCS-DE 2021), July 5 – 9 2021, Irkutsk, Russia
  https://iccs-de.icc.ru/en/

- Organizing committee member of the "Scientific Solar Summer School" (4Sun), 8 – 12 June 2020, Le Bourget-du-Lac, France
  https://www.univ-smb.fr/solaracademy/2020/02/28/4sun/

  Organizing committee: David Bailleul (Centre Antoine Favre/USMB), Fanck Barruel (PFE/INES), Lamia Berrah (LISTIC/USMB), Florence Besson (LOCIE/USMB), Denys Dutykh (CNRS/LAMA/USMB), Christophe Ménézo (LOCIE/USMB), Sébastien Monnet (LISTIC/USMB), Aude Pommeret (IREGE/USMB), Emilie Planes (LEPMI/USMB), Ioannis Tsanakas (INES/CEA), Monika Woloszyn (LOCIE/USMB), Etienne Wurtz (INES/CEA).

  Invited speakers: Matheus Bassani (Universidade Federal do Rio Grande do Sul, Brasil), David Martineau (Solaronix, Switzerland), Victoria Timchenko (University of New South Wales, Sydney, Australia), Sadok Bendkhil (Dracula Technologies, France), Solenn Berson (CEA, France), Romain Cariou (CEA, France), Louis De Fontenelle (Université de Pau et des Pays de l'Adour, France), Philippe Jacques (Université Savoie Mont Blanc, France), Laurent Vuillon (Université Savoie Mont Blanc, France).

- Member of the organizing committee of the "Second Eurasian Risk-2020 Conference, Symposium and Spring school", 12 – 19 April 2020, Tbilisi, Georgia
  http://www.eurasianrisk2020.ge/

- Programme committee member of "the 1st International Workshop on Information, Computation, and Control Systems for Distributed Environments" (ICCS-DE), July 8 – 9 2019, Irkutsk, Russia
  https://iccs-de.icc.ru/ws2019.php

- Program committee member and co-organizer of the WIN–2014 "*Wave interactions*" workshop, 23–26 April 2014, Linz, Austria (with C.C. Mei, E. Pelinovsky, E. Kartashova and M. Onorato)

  List of invited speakers: Shalva Amiranashvili, Lushuai Cao, Amin Chabchoub, Walter Craig, Antonio Degasperis, Ira Didenkulova, Eric Falcon, Roger Grimshaw, Zaher Hani, Timothée Jamin, Shijun Liao, Kiori Obusé, Miguel Onorato, Efim Pelinovsky, Davide Proment, Stephane Randoux, Lev Shemer, Victor Shrira, Alexey Slunyaev, Pierre Suret, Tatiana Talipova, Elena Tobisch, Takuji Waseda

- Scientific Committee member of the Conference "*Finite Volumes for Complex Applications VII*", 16 – 20 June 2014, Berlin, Germany
  http://www.wias-berlin.de/fvca7/

- Member of the Organizing Committee of the Program "*The Mathematics of Oceans*", May – June 2013, The Fields Institute, Toronto, Canada (along with W. Craig, D. Henderson, K. Lamb, M. Onorato, E. Pelinovsky, H. Segur and C. Sulem)

List of participants: More than 110 persons. The complete list is available here: http://www.fields.utoronto.ca/programs/scientific/12-13/mathofoceans/participants.html

- Co-organisation with Paul Milewski (University of Bath) of the Workshop "*Mathematical modeling and analysis of extreme sea waves*" at Fondation des Treilles, France, 8 – 13 October 2012.

  List of invited speakers: Ricardo Barros, Oliver Bühler, Wooyoung Choi, Didier Clamond, Frédéric Dias, Angel Durán, Denys Dutykh, Francesco Fedele, Serge Guillas, Christian Kharif, Chiang C. Mei, Paul Milewski, Marie Nguyen, Themistoklis Stefanakis, Esteban Tabak, Jon Wilkening.

- Scientific Committee member of the Conference "*Finite Volumes for Complex Applications VI*", 6 – 10 June 2011, Prague, Czech Republic
  http://fvca6.fs.cvut.cz/

- Co-organisation of the Workshop *MathOcéan* held at LAMA, University of Savoie, 31 January – 1 February 2011

  List of participants: Céline Acary-Robert, Ricardo Barros, Philippe Bonneton, Afaf Bouharguane, Christian Bourdarias, Didier Bresch, Mathieu Cathala, Frŕderic Charve, Florent Chazel, Anne-Laure Dalibard, Thierry Dauxois, Laurent Debreu, Jérémie Demange, Denys Dutykh, Mehmet Ersoy, Stéphane Gerbi, Marguerite Gisclon, Boris Haspot, Christophe Lacave, David Lannes, Vincent Legat, Yong Lu, Carine Lucas, Fabien Marche, Pascal Noble, Jean Rajchenbach, Miguel Rodrigues, Antoine Rousseau, Chantal Staquet, Benjamin Texier, Marion Tissier, Jean Zabsonré

- Co-organisation (with Didier Bresch and Marguerite Gisclon) of the session entitled "*Numerical models and methods for compressible and two-phase flows*" at the Wolfgang Pauli Institute (Vienna, Austria), 17 – 21 May 2010
  http://www.denys-dutykh.com/wpi10/

  List of invited speakers: Médéric Argentina, Marx Chhay, Catherine Choquet, Didier Clamond, Denys Dutykh, Ahmed Ossama Ghanem, Marguerite Gisclon, Theodoros Katsaounis, Valery Liapidevskii, Dimitrios Mitsotakis, Jean Rajchenbach, Jean-Claude Saut

- Co-organisation (with Didier Bresch and Céline Acary-Robert) of the session entitled "*Numerical methods for complex fluid flows*" at Wolfgang Pauli Institute (Vienna, Austria), 21 – 25 September 2009
  http://www.denys-dutykh.com/wpi09/

  List of invited speakers: Céline Acary-Robert, Médéric Argentina, Marx Chhay, Didier Clamond, Vassilios Dougalis, Denys Dutykh, Marc Francius, Marguerite Gisclon, Theodoros Katsaounis, Paul Milewski, Dimitrios Mitsotakis, Jean-Claude Saut

- Atelier Cargèse: "*Modélisation physico–numérique pour les fluides, les particules et le rayonnement. Confrontation modèles physiques et modèles numériques*". Institut d'Etudes Scientifique de Cargèse, Corsica, France, 24 – 30 September 2006

  List of participants: Céline Baranger, Daniel Bouche, Barbara Bouffandeau, Jean-Philippe Braeunig, Michel Brochard, Christophe Buet, Gilles Carre, Frédéric Chardard, Alain Decoster, Benoît Desjardins, Laurent Desvillettes, Florian De Vuyst, Frédéric Dias, Denys Dutykh, Cédric Énaux, Christophe Fochesato, Jean-Michel Ghidaglia, Laurence Gozalo, Olivier Heuzé, Gilles Kluth, Kim-Claire Le Thanh, Antoine Llor, Julien Mathiaud, Jérôme Metral, Michaël Montout, Hai Yen Nguyen, Frédéric Pascal, Thierry Pougeard-Dulimbert, Olivier Poujade, Agnès Pujols, Bernard Rebourcet, Motte Renaud, Jean-Michel Rovarch, Gérald Samba, Muriel Sesques, Vincent Siess

8.11 Research projects

8.11.1 Faculty Start-Up Grants

February 2023 – January 2025 Project title: "*Nonlinear waves in geophysics and biomechanics*", project number: FSU-2023-014. Funded by the Khalifa University of Science and Technology. Total cost: **1 426 232.49 AED**

8.11.2 ANR projects

ANR = Agence Nationale de la Recherche

- L'École Universitaire de Recherche (EUR) "**Solar Academy**" created at the University Savoie Mont Blanc in the framework of the "Programme d'Investissement d'Avenir" (PIA3). Project leader: Prof. Monika Wołoszyn (LOCIE/USMB)

- Project **FRAISE** (2016 – 2020): "*Absorbent falling film with free-surface instabilities: exploration*". Principal investigator: C. Ruyer-Quil (LOCIE, Polytech Annecy–hambéry and Université Savoie Mont Blanc, Chambéry, France)

- Project **MathOcéan** (2009 – 2012): "*Analyse mathématique en océanographie et applications*". Principal investigator: D. Lannes (DMA, ENS Paris, France)

- Project **HEXECO** (2007 – 2010): "*Hydrodynamique extrême du large à la côte*". Principal investigator: O. Kimmoun (Ecole Centrale Marseille, France)

8.11.3 International cooperation projects

- **AAP USMB** (2020) of the University Savoie Mont Blanc: "*Genesis and propagation of a tsunami wave on an accretionary prism*". Co-PI: Prof. Emeritus Christian Beck (ISTerre, USMB). Cooperation with Prof. Valery Liapidevskii from the Lavrentyev Institute of Hydrodynamics, SB RAS, Novosibirsk, Russia.

- **AAP USMB** (2018) of the University Savoie Mont Blanc: "*Nonlinear waves on adaptive moving meshes*". Cooperation with the Victoria University of Wellington (New Zealand) and the University of Valladolid (Spain)

- **Partnership Hubert Curien (PHC) – Parrot 2017** (French – Estonian cooperation). Project title: "The effect of beach roughness on sea wave run-up". Partner: Tallinn University of Technology and Marine Systems Institute, Tallinn, Estonia. French PI: D. Dutykh (LAMA, University Savoie Mont Blanc), Estonian PI: I. Didenkulova (Marine Systems Institute, TalTech, Estonia)

- **LEA Math Mode** (Laboratoire Européen Associé CNRS Franco–Roumain Mathématiques et Modélisation) (2015 – 2016) project "*A variational approach to water waves in shallow waters*". Cooperation with Dr. Delia Ionescu-Kruse (IMAR, Bucharest, Romania)

- **AAP Montagne** (2016) of the University Savoie Mont Blanc: "*Modelling and simulation of sliding masses*". Cooperation with Prof. Valery Liapidevskii from the Lavrentyev Institute of Hydrodynamics, SB RAS, Novosibirsk, Russia

- French–Russian cooperative project (**Convention d'échange**) N° EDC26179 (2014 – 2015) "*Interaction of waves with obstacles*". Cooperation with Prof. G. Khakimzyanov (Institute of Computational Technologies, SB RAS, Novosibirsk, Russia)

- Project **PICS CNRS** (2010 – 2012) "*Numerical simulation of higly nonlinear water waves*". Cooperation with the Institute of Computational Technologies, Siberian Branch of Russian Academy of Sciences and Novosibirsk State University. French leader: D. Dutykh (LAMA, University of Savoie), Russian leader: Yu. Shokin (academician, director of Institute of Computational Technologies)

- **Partnership Hubert Curien (PHC) – ULYSSES 2010** (French – Irish cooperation). Project title: "*Numerical Models for Compressible and Incompressible Flows and Applications*". Partners: School of Mathematical Sciences (University College Dublin), CMLA (ENS de Cachan) and LAMA, University of Savoie. French leader: D. Dutykh (LAMA, University of Savoie), Irish leader: T. Cox (School of Mathematical Sciences, University College Dublin)

- **CNRS/Russian Academy of Sciences exchange program** (2009 – 2011). Project title "*Analytical and numerical solutions for the models of powder-snow avalanches*". French leader: D. Dutykh (LAMA, University of Savoie), Russian partner leader: V. Liapidevskii (Lavrentyev Institute of Hydrodynamics, Novosibirsk)

8.11.4 Other projects

- Project **PEPS CNRS Énergie** (2017) "*Innovative numerical methods for more energetically efficient buildings*". Partners: LOCIE UMR 5271 (Polytech Annecy–Chambéry). Project leader: D. Dutykh (LAMA, University Savoie Mont Blanc)

- Project **PEPS CNRS InPhyNiTi** (INSMI/INP) (2014 – 2015) "*Faraday instability in the Hele-Shaw cell*". Partners: Laboratory J.-A. Dieudonné (LJAD, University of Nice Sophia Antipolis), Laboratory of the Condensed Matter Physics (LPMC, University of Nice Sophia Antipolis), Laboratory of Mathematics (LAMA, University Savoie Mont Blanc). Project leader: D. Dutykh (LAMA, University Savoie Mont Blanc)

- Project **PEPS CNRS** (INP) (2010 – 2011) "*Numerical simulation of nonlinear waves in variable medium*". Partners: Laboratory J.-A. Dieudonné (LJAD, University of Nice Sophia Antipolis), Laboratory of the Condensed Matter Physics (LPMC, University of Nice Sophia Antipolis), Laboratory of Mathematics (LAMA, University of Savoie). Project leader: D. Dutykh (LAMA, University of Savoie)

- Contract with région Rhône-Alpes (Cluster Environnement): "*Numerical simulation of snow avalanches*" (2009 – 2010)

- Project **PEPS CNRS** (INS2I) (2009 – 2010) "*PML, l'arithmétique et le calcul: vers l'arithmétique et le calcul numérique efficace et élégamment certifié*". Partners: teams LIMD and EDPs² of LAMA, University of Savoie. Project leader: C. Raffalli (LAMA, University of Savoie)

9 Teaching and supervision activities

9.1 Teaching

Fall 2025: Instructor for Calculus III (MATH231, 3 credits) after J. Stewart's book at the College of Computing and Mathematical Sciences, Khalifa University of Science and Technology, Abu Dhabi, UAE

Summer 2025: Instructor of the Calculus III (MATH231) class (3 + 3 credits; after J. Stewart's book) at the College of Computing and Mathematical Sciences, Khalifa University of Science and Technology, Abu Dhabi, UAE

Spring 2025: Instructor for Calculus III (MATH231, 3 credits) and Engineering Mathematics (MATH232, 3 credits) classes after J. Stewart's and E. Kreyszig books at the College of Computing and Mathematical Sciences, Khalifa University of Science and Technology, Abu Dhabi, UAE

Fall 2024: Instructor for Calculus III (MATH231, 3 credits) and Engineering Mathematics (MATH232, 3 credits) classes after J. Stewart's and E. Kreyszig books at the College of Computing and Mathematical Sciences, Khalifa University of Science and Technology, Abu Dhabi, UAE

Summer 2024: Instructor for Calculus III (MATH231, 3 credits) and Engineering Mathematics (MATH232, 3 credits) classes after J. Stewart's and E. Kreyszig books at the College of Computing and Mathematical Sciences, Khalifa University of Science and Technology, Abu Dhabi, UAE

Spring 2024: Instructor of the Calculus III (MATH231) class (3 credits; after J. Stewart's book) and Real Analysis I (MATH234) class (3 credits; after S. Lay's book "Analysis with an Introduction to Proof") at the College of Arts and Sciences, Khalifa University of Science and Technology, Abu Dhabi, UAE

Fall 2023: Instructor and coordinator of the Calculus III (MATH231) class (3 + 3 credits; after J. Stewart's book) at the College of Computing and Mathematical Sciences, Khalifa University of Science and Technology, Abu Dhabi, UAE

Summer 2023: Instructor and coordinator of the Calculus III (MATH231) class (3 + 3 credits; after J. Stewart's book) at the College of Computing and Mathematical Sciences, Khalifa University of Science and Technology, Abu Dhabi, UAE

Spring 2023: Instructor and coordinator of the Calculus III (MATH231) class (3 + 3 credits; after J. Stewart's book) at the College of Arts and Sciences, Khalifa University of Science and Technology, Abu Dhabi, UAE

Fall 2022: Instructor of the Calculus III (MATH231) class (3 + 3 credits; after J. Stewart's book) at the College of Arts and Sciences, Khalifa University of Science and Technology, Abu Dhabi, UAE

Fall 2021: Practical sessions (16h) of the class "Applied Analysis" taught by Prof. Marguerite Gisclon for the first year Master degree students (M1) in Applied Mathematics at the University Savoie Mont Blanc

Fall 2020: "Introduction to C++" (INFO701) course at the Department of Computer Science, University Savoie Mont Blanc (32h: Lectures and practical sessions for the first year Master degree students (M1) in Applied Mathematics)

Fall 2019: "Programming in MATLAB™" (INFO701_MATH, M1 level) at the Department of Computer Science, University Savoie Mont Blanc (32h: Lectures and practical sessions for the first year Master degree students (M1) in Applied Mathematics)

Fall 2018: "Mathematical tools — III" (MATH302_MPC, L2 level) at the Department of Mathematics, University Savoie Mont Blanc (47h: Lectures, practical sessions and final examination for second year students in Mathematics, Physics and Chemistry). Approximate course programme:

- Functions of many variables
- Vector calculus
- Fundamental theorems of integral calculus
- Curvilinear coordinates
- Differential operators in orthogonal non-Cartesian coordinate systems

Fall 2018: "Programming in C++" (INFO901_MATH, M2 level) at the Department of Computer Science, University Savoie Mont Blanc (32h: Lectures and practical sessions for the second year Master degree students (M2) in Applied Mathematics)

Fall 2018: "Programming in MATLAB™" (INFO701_MATH, M1 level) at the Department of Computer Science, University Savoie Mont Blanc (32h: Lectures and practical sessions for the first year Master degree students (M1) in Applied Mathematics)

Fall 2017: "Mathematical tools — III" (MATH302_MPC, L2 level) at the Department of Mathematics, University Savoie Mont Blanc (47h: Lectures, practical sessions and final examination for second year students in Mathematics, Physics and Chemistry). Approximate course programme:

- Functions of many variables
- Vector calculus
- Fundamental theorems of integral calculus
- Curvilinear coordinates
- Differential operators in orthogonal non-Cartesian coordinate systems

Fall 2017: "Programming in MATLAB™" (INFO701_MATH, M1 level) at the Department of Computer Science, University Savoie Mont Blanc (32h: Lectures and practical sessions for the first year Master degree students (M1) in Applied Mathematics)

April 2016: Short course (8h) on Spectral methods at the PhD School on Numerical Methods for Diffusion Phenomena, Pontifical Catholic University of Parana, Curitiba, Brazil

- Lecture notes: https://cel.archives-ouvertes.fr/cel-01256472/

April 2015: Short course (8h of Lectures) on "*A short introduction to Fluid Dynamics*", Basque Center for Applied Mathematics (BCAM). Course programme:

1. Review of (exterior) vector calculus
2. Eulerian description of fluid flows
3. Lagrangian description of fluids
4. Smoothed Particle Hydrodynamics

- Lecture notes: https://github.com/dutykh/hydro/

December 2014: Short course (20h of Lectures + 15h of TDs) on "*Lagrangian and Eulerian approaches to water wave modelling*", Faculty of Mechanics and Mathematics, Al-Farabi Kazakh National University, Almaty, Kazakhstan.

- Lecture notes: https://github.com/dutykh/hydro/

May 2013: Short course on "*Numerical methods for fully nonlinear free surface water waves*", Fields Institute, Thematic Program on the Mathematics of Oceans, Toronto, Canada (4h)

- Slides: http://cel.archives-ouvertes.fr/cel-00825492/

- Videos: http://www.fields.utoronto.ca/video-archive/event/223/2013

2009 – 2010: Part-time tutor at the University of Savoie (16 hours)

- Practical classes for the 3rd year Math students on: "*Numerical solution of ODEs*"

2007 – 2008: Teaching assistant at the Department of Mathematics, École Normale Supérieure de Cachan (64 hours)

- Students preparation to the national civil service competitive examination "Agrégation", option "Scientific computing and modeling"
- Practical classes under Matlab for the course "Numerical methods and Scientific Computing"
- Commission member for oral trial examinations for the "Agrégation"

2006 – 2007: Teaching assistant at the Department of Mathematics, École Normale Supérieure de Cachan (64 hours)

- Students preparation to the national civil service competitive examination "Agrégation", option "Scientific computing and modeling"
- Practical classes under Matlab for the course "Numerical methods and Scientific Computing"
- Commission member for oral trial examinations for the "Agrégation"

2005 – 2006: Teaching assistant at the Department of Mathematics, École Normale Supérieure de Cachan (64 hours)

- Preparing students to the national civil service competitive examination "Agrégation", option "Scientific computing and modeling"
- Practical classes under Matlab for the course "Numerical methods and Scientific Computing"
- Practical classes under Matlab for the course "Optimization"
- Commission member for oral trial examinations for the "Agrégation"

9.2 Organization of teaching activities

4 – 5 November 2019: Organization of a mini-course (6h) entitled "*Introduction to derived geometries*" by Dr. Jacob Kryczka (LAREMA, University of Angers, France) delivered in LAMA UMR 5127, University Savoie Mont Blanc. **Audience**: researchers and PhD students.

June – July 2019: Organization of a mini-course (8h) entitled "*Convergence acceleration methods*" by Prof. Angel Durán (University of Valladolid, Spain) delivered in LAMA UMR 5127, University Savoie Mont Blanc. **Audience**: researchers, PhD and Master students.

9.3 Students supervision

9.3.1 Post-docs

- Dr. **Ahmad Deeb** (July 2023 – February 2026). Research topic: "*Globalized numerical integrators in time using the resummation of divergent series*". Funded by KU FSU grant.
- Dr. **Muhammad Asjad** (July 2023 – May 2024). Research topic: "*Quantum optics and quantum information theory*". Funded by KU FSU grant.
- Dr. **Amin Rashidi** (March 2021 – March 2022). Research topic: "*Genesis and propagation of a tsunami wave on an accretionary prism*". Co-supervision with Prof. Emeritus Christian Beck (ISTerre, USMB). Financed by USMB.
- Dr. **Julien Berger** (April 2016 – January 2017): Co-supervision with N. Mendes (PUCPR, Curitiba, Brasil). Research topic: "*Techniques de réduction de modèle pour la résolution de problèmes en physique du bâtiment*". Financed by CAPES. Currently working at Laboratoire des Sciences de l'Ingénieur pour l'Environnement (LaSIE) — UMR CNRS 7356, Université La Rochelle, France
- Dr. **Claudio Viotti** (September 2012 – August 2013): Co-supervision with F. Dias, ERC MULTIWAVE Project funding. Research topic: "*Breathers under the Dysthe and full Euler dynamics*". Currently working as a software engineer at Miravex, Dublin, Ireland
- Dr. **Francesco Carbone** (September 2012 – August 2013): Co-supervision with F. Dias, ERC MULTIWAVE Project funding. Research topic: "*Wave focussing effect in various physical systems*". Currently working at CNR, IIA, Italy.

9.3.2 PhD students

- (2024 – 2026) **Mark Essa Sukaiti**: Co-supervision with Prof. Davide Batic (Khalifa University). PhD thesis title: "*Spinning manifolds: the effects of rotation in general relativity*". Defence is expected in June 2026.
- (2022 – 2025) **Srijani Mukherjee**: Co-supervision with Dr. Ioannis Tsanakas (CEA/INES) and Prof. Laurent Vuillon (University Savoie Mont Blanc). PhD thesis title: "*Advanced diagnostics of PV plants by imagery analytics and data fusion*". Defence is expected in December 2025.
- (2022 – 2025) **Muhammad Naveer Zafar**: Co-supervision with Prof. Pierre Sabatier (EDYTEM/University Savoie Mont Blanc). PhD thesis title: "*Discontinuous Galerkin method for tsunami sediment transport model*". Defence is expected in October 2025.
- (2022 – 2025) **Florian Gallois**: Co-supervision with Dr. Mikaël Cugnet (CEA/INES) and Angel Kirchev (CEA/INES). PhD thesis title: "*Online diagnosis of the states of charge (SOC) and health (SOH) for lead-acid batteries*". Defended on the 11$^{\text{th}}$ of June 2025.

- (2020 – 2023) **Rim El Cheikh**: Co-supervision with Prof. Stéphane Gerbi (LAMA/USMB). PhD thesis title: "*Mathematical modelling of nonlinear waves in coastal and biological systems*". Defended on the 25$^{\text{th}}$ of December 2024.

- (2021 – 2024) **Carlos Rodrigo Cardenas Bravo**: Co-supervision with Dr. Duy Long Ha (CEA Grenoble/INES). PhD thesis title: "*Coupling of Electrical and Thermal Models for the Diagnosis of Photovoltaic Modules*". Defended on the 25$^{\text{th}}$ of September 2024.

- (2021 – 2024) **Noura Al Akkari**: Co-supervision with Dr. Sylvain Lespinats (CEA Grenoble/INES) and Dr. Aurélie Foucquier (CEA Grenoble/INES). PhD thesis title: "*Supervised empirical decomposition of time signals of power consumption*".

- (2021 – 2024) **Sorina Mustatea**: Co-supervision with Dr. Sylvain Lespinats (CEA Grenoble/INES). PhD thesis title: "*Diagnostic and prognostic tools for inverters and PV modules using machine learning approaches*".

- (2018 – 2021) **Zhanat Karashbayeva**: Co-supervision with Prof. Bolatbek Rysbayuly and Prof. Abilmazhin Adamov (L.N. Gumilyov Eurasian National University, Astana, Kazakhstan). PhD thesis title: "*Development of methods for solving some coefficient-inverse problems of heat and mass transfer and computational experiments*". Defended on the 25$^{\text{th}}$ of August 2023.

- (2017 – 2021) **Benoît Colange**: Co-supervision with Dr. Sylvain Lespinats (CEA Grenoble/INES). PhD thesis title: "*Diagnostic de systèmes électriques par analyse intelligente de structures de données de grandes dimension*". Defended on the 26$^{\text{th}}$ of May 2021.

- (2017 – 2020) **Ahmed Alkarory Ahmed Abdalazeez**: Co-supervision with Prof. Ira Didenkulova (Marine Systems Institute, Tallinn University of Technology, Estonia). PhD thesis title: "*Influence of sea bed bathymetry and coastal topography on statistical characteristics of wave run-up on a beach*". Defended on the 26$^{\text{th}}$ November 2020.

- (2015 – 2019) Dr. **Suelen Gasparin**: Co-supervision with Prof. Nathan Mendes (PUCPR, Curitiba, Brasil). PhD thesis title: "*Numerical methods for predicting heat and moisture transfer through porous building materials*". Scholarship CAPES-COFECUB, projet N$^{\text{o}}$ 774/2013. Defended on the 3$^{\text{rd}}$ of June 2019.

- (2015 – 2018) Dr. **Amin Rashidi**: Co-supervision with Prof. Zaher Hossein Shomaii (Institute of Geophysics, University of Tehran, Iran). PhD thesis title: "*Numerical simulation and hazard assessment of the effect of tsunamigenic scenarios on the Western Makran region using structural detection and restoration*". Defended on the 23$^{\text{rd}}$ October 2018.

- (2012 – 2017) **Aidar Assylbekuly**: Co-supervision with Prof. Dauren Zhakebaev (Faculty of Mechanics and Mathematics, Al-Farabi Kazakh National University).

PhD thesis title: "*Modelling of the multifactor pulsed impact onto a multicomponent liquid*".

- (2007 – 2010) Dr. **Louis Stephan**: Co-supervision with Prof. Etienne Wurtz (INES-LOCIE, University of Savoie). PhD thesis title: "*Modélisation de la ventilation naturelle pour l'optimisation du rafraîchissement passif des bâtiments*". Defended on April 16, 2010.

9.3.3 Master 2 students

- **Aseel Alsaid Souliman** (Khalifa University of Science and Technology) (May 2025 – May 2026), subject: "*A framework combining optimal control and reduced order modeling for accelerated blood flow simulations*". Co-supervision with Prof. Aymen Laadhari (Khalifa University)
- **Joud Mohamad Mojahed Faraji** (Khalifa University of Science and Technology) (May 2025 – May 2026), subject: "*Applications of the spectral methods in quantum mechanics*". Co-supervision with Prof. Davide Batic (Khalifa University)
- **Florian Gallois** (University Savoie Mont Blanc) (March 2021 – August 2021), subject: "*Experimental validation of a two-electrode physical model and reduction of computational time vs. the empirical model*". Co-supervision with Dr. Mikaël Cugnet (CEA/INES)
- **Florian Gallois** (University Savoie Mont Blanc) (May 2021 – July 2021), CMI Project on the topic: "*Numerical solution of unsteady advection–diffusion–reaction equations*".
- **Michelle Lee** (University Savoie Mont Blanc) (April 2021 – September 2021), subject: "*Data analysis in the context of solar energy deployment in urban areas*". Co-supervision with Prof. Lamia Berrah (LISTIC/USMB), Dr. Aurélie Foucquier (CEA/INES) & Dr. Martin Thebault (LOCIE/USMB)
- **Yannick Meyapin** (March – July 2010) (University of Savoie), subject: "*Numerical simulation of single-velocity two-phase flows*". Co-supervision with M. Gisclon (LAMA, University of Savoie)
- **Ahmed Ossama Ghanem** (March – July 2010) (University of Haute Alsace), subject: "*Numerical simulation of the Faraday instability*". Co-supervision with M. Gisclon (LAMA, University of Savoie) and J. Rajchenbach (LPMC, University of Nice Sophia-Antipolis)
- **Xavier Gardeil** (March – September 2010) (University of Savoie): co-supervision with C. Beck (LGCA, University of Savoie), subject: "*Tsunami wave modeling at the North of Venezuela*"
- **Yannick Meyapin** (March – June 2009) (University of Savoie): Co-supervision with M. Gisclon (LAMA, University of Savoie), subject: "*Velocity and energy relaxation in two-phase flows*"

- **Youen Kervella** (March – July 2006) (Master 2 Physics of the Ocean and Atmosphere, University of Brest), subject: "*Comparison between linear and nonlinear models of tsunami generation*". Co-supervision with F. Dias

9.3.4 Senior Research Projects

- **Joudy Feras Jamal Beek** (Khalifa University ID 100061683) (September 2024 – May 2025), subject: "*A Spectral Approach for Quasi-normal Modes of Non-commutative Wormholes*". Co-supervision with Profs. Davide Batic (Mathematics Department, Khalifa University) and Fedor Kusmartsev (Physics Department, Khalifa University).

- **Zeinabou Ahmed Abou** (Khalifa University ID 100060187) (September 2024 – May 2025), subject: "*Quasinormal modes of noncommutative geometry-inspired dirty black holes*". Co-supervision with Prof. Davide Batic (Mathematics Department, Khalifa University).

- **Maria Benkhelifa** (Khalifa University ID 100059472) (September 2023 – May 2024), subject: "*Pushed-pulled front transitions in tumor growth: continuous modelling*". Co-supervision with Dr. Haralampos Hatzikirou (Mathematics Department, Khalifa University of Science and Technology).

- **Hana Herbawi** (Khalifa University ID 100059412) (September 2023 – May 2024), subject: "*Pushed-pulled front transitions in tumor growth: discrete modelling*". Co-supervision with Dr. Haralampos Hatzikirou (Mathematics Department, Khalifa University of Science and Technology).

9.3.5 Work-study students

- **Mathieu Vidal** (University Savoie Mont Blanc — NTN–SNR Group) (September 2022 – September 2023), subject: "*Integration of an optimization procedure into the existing computational tool to determine the preload value minimizing the dissipated power of a rolling*". Co-supervision with Cédric Burnet (NTN–SNR Group, Annecy).

- **Yacine Hedeoud** (University Savoie Mont Blanc — NTN–SNR Group) (September 2021 – September 2022), subject: "*Search of mathematical strategies allowing the reduction of the number of computational case studies*". Co-supervision with Cédric Burnet (NTN–SNR Group, Annecy).

9.3.6 Master 1 students

- **Léa Bucher** (University Savoie Mont Blanc) (May – August 2022), subject: "*Modeling of the self-discharge phenomenon of a lead-acid cell*". Co-supervision with Dr. Mikaël Cugnet (CEA/INES)

- **Mathieu Vidal** (University Savoie Mont Blanc) (May – August 2022), subject: "*Integration of an optimization procedure into the existing computational tool to determine the preload value minimizing the dissipated power of a rolling*". Co-supervision with Cédric Burnet (NTN–SNR Group, Annecy)

- **Yacine Hedeoud** (University Savoie Mont Blanc) (May – June 2021), subject: "*Search of mathematical strategies allowing the reduction of the number of computational case studies*". Co-supervision with Cédric Burnet (NTN–SNR Group, Annecy)

- **Florian Gallois** (University Savoie Mont Blanc) (May 2020 – August 2020), subject: "*Mathematical model of a porous lead electrode*". Co-supervision with Dr. Mikaël Cugnet (CEA/INES)

- **Magali Pollet** (University Savoie Mont Blanc) (December 2019 – May 2020), subject: "*Les exposants de Lyapunov dans des systèmes dynamiques à temps continu*"

- **Christoffer Stuart** (Chalmers University of Technology – University Savoie Mont Blanc) (January 2018 – May 2018), subject: "*A critical evaluation of modern constrained optimization solvers*"

- **Zakaria Ait Allal** and **Younès Mahri** (University Savoie Mont Blanc) (January 2018 – May 2018), subject: "*Méthodes variationnelles en mécanique analytique*"

- **Ariane Cotte** (April – July 2013) (École Polytechnique): Co-supervision with F. Dias (UCD), subject: "*Submarine landslide modelling on real-world 3D bathymetries*"

- **Lauranne Pellet** (March – July 2013) (École Centrale Marseille): Co-supervision with F. Dias (UCD), subject: "*Mathematical modelling of underwater microseisms*"

- **Mickaël Roulet** (March – May 2011) (University of Savoie, M1 Mathematics), subject: "*Finite volume schemes for Nonlinear Shallow Water Equations with wetting/drying processes*"

- **Mahmut Tuz** (May – June 2010) (University of Savoie, M1 Physics), subject: "*Numerical computation of the Dirichlet-to-Neumann map*"

9.3.7 Other students

- **Sofia Samir** (May – August 2024) (Undergraduate Applied Mathematics and Statistics major, KU ID 100061155): Khalifa University internship in the quality of a Teaching Assistant during Summer 2024 semester.

- **Cissy Boisdur** (January – May 2023) (L3 Maths/Info, University Savoie Mont Blanc): "*La méthode de quadrature de Gaußest-elle meilleure que celle de Clenshaw-Curtis?*"

- **Hugo Da Cunha** (May – June 2021) (ENS Lyon): "*Étude théorique et numérique d'un système couplé pour l'accoustique. Dérivées d'ordre non entier*". Co-supervision with Dr. Hervé Le Meur (CNRS/LAMFA/UPJV)
- **Reham Nassif** (January – June 2021) (CMI Mathématiques, USMB): "*Algorithmes d'approximation numérique de la mesure de Mahler*"
- **Martin Rialhe-Badet** (January – May 2020) (CMI Mathématiques, USMB): "*La théorie du quasi-déterminisme de Boccotti*"
- **Alizée Dubois** (June 2012) (L3 ENS Cachan-Bretagne) (co-supervision with F. Dias): "*Réflexion de la houle contre une paroi / Wave reflexion against a wall*"
- **Ianis Bernard** (March – June 2009) (Classes préparatoires, Nice). Participation in the supervision of a practical personal work (TIPE). Subject: "*Modeling of a hydraulic soliton*"

9.4 Habilitation thesis committees

- (referee) Dr. **Mehmet Ersoy**: Thesis title: "*From hydrostatic to non-hydrostatic models in fluid mechanics: modeling, mathematical and numerical analysis, and computational fluid dynamics*", the 1st December 2020, University of Toulon, France, 2020.
  - Composition of the committee: Didier Bresch, Denys Dutykh, Thierry Gallouët, Cédric Galusinski, Raphaële Herbin, Theodoros Katsaounis, Corrado Mascia, Antonin Novotny, Enrique Zuazua.
- (referee) **Vassili A. Gromov**: Dr.Sci. title: "", October 5, 2017, Oles Honchar Dnipro National University, Dnipro, Ukraine.

9.5 PhD thesis committees

- (referee) Dr. **Alice Abbate**: PhD thesis title: "*On the trade-off between accuracy and efficiency in Probabilistic Tsunami Hazard Assessment*", March 28, 2025, University of Trieste, Italy. Advisor: Dr. Stefano Lorito (National Institute of Geophysics and Volcanology, Rome, Italy).
- (examiner) Dr. **Fatima-Zahra Miami**: PhD thesis title: "*Development of a phase-resolving computer model for operational nearshore wave assessment*", February 3, 2023, SIAME, Université de Pau et des Pays de l'Adour, France. Advisors: Prof. Volker Roeber (HPC-Waves Chair, UPPA) and Dr. Denis Morichon (UPPA).
- (examiner) Dr. **Iskander Abroug**: PhD thesis title: "*Étude des vagues extrêmes se propageant d'une profondeur intermédiaire vers le rivage*", December 2, 2019, Laboratoire LOMC UMR 6294, Université Le Havre, France. Advisors: Prof. François Marin (LOMC UMR 6294), Dr. Nizar Abcha (M2C UMR 6143) and Dr. Armelle Jarno (LOMC UMR 6294).

- (referee) Dr. **Rémi Carmigniani**: PhD thesis title: "*Redresseurs de vagues: vers une nouvelle stratégie d'extraction de l'énergie houlomotrice*", December 14, 2017, Laboratoire d'Hydraulique Saint-Venant, EDF Chatou, France. Advisors: Dr. Damien Violeau (EDF Chatou, France) and Prof. Morteza Gharib (Caltech, USA).

- (referee) Dr. **Marine Le Gal**: PhD thesis title: "*Influence des échelles de temps sur la dynamique des tsunamis d'origine sismique*", February 17, 2017, Laboratoire d'Hydraulique Saint-Venant, EDF Chatou, France. Advisor: Dr. Damien Violeau.

- (referee) Dr. **Pauline Robin**: PhD thesis title: "*Hydrodynamique extrême en mer près des côtes*", July 18, 2013, Institut de Recherche sur les Phénomènes Hors Équilibre (IRPHE), Université de Provence – Aix-Marseille I, France. Advisors: Prof. Christian Kharif and Dr. Olivier Kimmoun.

- (examiner) Dr. **Brice Eichwald**: PhD thesis title: "*Intégrateurs exponentiels modifiés pour la simulation des vagues non linéaires*", July 5, 2013, Laboratoire Dieudonné, Université de Nice Sophia-Antipolis, France. Advisors: Prof. Didier Clamond and Dr. Marc Francius.

- (examiner) Dr. **Georges Sadaka**: PhD thesis title: "*Étude Mathématique et numérique d'équations d'ondes aquatiques amorties*", November 25, 2011, LAMFA, University of Picardie Jules Verne, France. Advisor: Prof. Jean-Paul Chehab.

- (examiner) Dr. **Louis Stephan**: PhD thesis title: "*Modélisation de la ventilation naturelle pour l'optimisation du rafraîchissement passif des bâtiments*", April 16, 2010, INES-LOCIE, University of Savoie, France. Main advisor: Dr. Etienne Wurtz.

- (examiner) Dr. **Marx Chhay**: PhD thesis title: "*Intégrateurs géométriques: Application à la Mécanique des Fluides*", December 16, 2008, LEPTIAB, University of La Rochelle, France. PhD advisors: Prof. Aziz Hamdouni and Prof. Pierre Sagaut.

10 Responsibilities

10.1 Administrative Responsibilities

- Head of the Seminar Committee at Mathematics Department, Khalifa University of Science and Technology (2022 – present). Complete composition of the committee: Erkko Lehtonen (Math Department, KU), Yerkin Kitapbayev (Math Department, KU).

- Member of the selection committee for the Master S3E – Solar Energy (2021 – 2022). Complete composition of the committee: David Bailleul (Centre Antoine Favre, USMB), Lamia Berrah (LISTIC EA 3703, USMB), Dorothée Charlier (IREGE, USMB), Gilles Fraisse (LOCIE UMR 5271, USMB), Christophe Ménézo (LOCIE UMR 5271, USMB), Emilie Planes (LEPMI UMR 5279, USMB), Aude Pommeret

(IREGE, USMB), Simon Rouchier (LOCIE UMR 5271, USMB), Christian Ruyer-Quil (LOCIE UMR 5271), Bernard Souyri (LOCIE UMR 5271, USMB), Monika Woloszyn (LOCIE UMR 5271, USMB)

- In charge of communication ("Correspondant communication") with CNRS and USMB at LAMA UMR 5127 (2017 – 2022)
- Member of the consulting committee in Sections 25–26 at the University Savoie Mont Blanc (2015 – 2020)
- Video recording of some seminars taking place in LAMA (provided that the speaker accepts to be taped). (2017 – 2022) Recorded and processed videos are available at `https://www.youtube.com/user/dutykh/`
- Member of the UFR SFA Board (2009 – 2012)
- Member of the Research Board of the Laboratory of Mathematics LAMA, University of Savoie (2009 – 2012)
- In charge of innovation and knowledge transfer activities (chargé de valorisation) at LAMA (2008 – 2012)
- Representative of LAMA in **Fédération de recherche Vulnérabilité des Ouvrages aux Risques** (VOR) (2008 – 2012)
- Representative of LAMA in **International Center for Applied Computational Mechanics** (ICACM) (2008 – 2012)
- Member of the Hiring Committees in:
  - Applied Mathematics (section 26), Mechanics (section 60), Laboratoire J.-A. Dieudonné, University of Nice Sophia Antipolis
  - Applied Mathematics (section 26), LAMA, University of Savoie Mont Blanc
  - Thermics (section 62), LOCIE, Polytech Annecy Chambéry

10.2 Seminars

During past years I actively participated in running following seminars:

October 2022 – present: Co-organizer and head of the Mathematics Seminar Committee (along with Drs. Yerkin Kitapbayev and Erkko Lehtonen) at the Khalifa University of Science and Technology, Abu Dhabi, UAE

January 2013 – July 2018: Seminar of the team EDPs^2 and Groupe de Discussion (GdD), LAMA, University of Savoie. Participation, invitation of speakers

October 2008 – July 2012: Seminar of the team EDPs^2, LAMA, University of Savoie. Participation, invitation of speakers

September 2004 – July 2008: Working group: *Mécanique des Fluides Réels*, Centre de Mathématiques et de Leurs Applications (CMLA), ENS de Cachan

10.3 General audience events

- Stand on tsunami waves (together with Professor Christian Beck, LGCA, University of Savoie) at the **Fête de la Science 2009**, Galérie Eureka, Chambéry, France
- General audience lecture: **Tsunamis: du terrain au modèle numérique** (with Professor Christian Beck, LGCA, University of Savoie) in the framework of the *Fête de la Science 2009*, 21 November 2009, Cinéma Curial, Chambéry, France
- Recurrent participation in **Open Doors Days** at the University of Savoie with public lectures on water and tsunami waves

11 Other interests

Sports	cycling, skiing, bodybuilding, badminton
Hobbies	reading, photography, tourism

12 Academic references

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12.1 Supplementary academic references

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