

Curriculum vitæ

DENYS DUTYKH

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Keywords: mathematical modeling, free surface flows, hydrodynamics, variational principles, two-phase flows, finite volumes, spectral methods, scientific computing

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1 Curriculum vitæ

1.1 Personal information

LAST NAME	DUTYKH
FIRST NAME	Denys
DATE OF BIRTH	the 17th August 1982
PLACE OF BIRTH	Pologui, Ukraine
CITIZENSHIPS	French, Ukrainian
FAMILY STATUS	married
DRIVING LICENCE	Category B
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2 Awards

- Prime d'Excellence Scientifique (PES) attributed by INSMI CNRS, 2014
- [Le Prix La Recherche 2007](#), nomination “Environment” sponsored by [Veolia](#), research: “Extreme waves: from physics to the effective prevention”. Ceremony held on the 27th November 2007 at Luxembourg Palace, Paris, France
- [Best Student Paper Award](#) at “*The Fifth IMACS International Conference on Non-linear Evolution Equations and Wave Phenomena: Computation and Theory*”, Athens, GA, USA, April 16 – 19, 2007

3 Professional experience

November 2012 – present: Chargé de recherche C.N.R.S. of the 1st class (CR1) at the Laboratory of Mathematics (LAMA – UMR 5127), University of Savoie, France

September 2012 – December 2013: Senior Research Fellow at the School of Mathematical Sciences, University College Dublin, Ireland (working on ERC AdGr “MULTIWAVE” project)

October 2008 – October 2012: Chargé de recherche C.N.R.S. of the 2nd class (CR2) at the Laboratory of Mathematics (LAMA – UMR 5127), University of Savoie, France

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

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

4 Education & Training

December 2010: Habilitation à Diriger des Recherches defended at the Laboratory of Mathematics (LAMA), University of Savoie. 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 project: “*Moving load on a layered floating ice sheet*” under the supervision of Frédéric DIAS. Grade: 19/20

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

- Research project: “*Harmonic oscillations of an inhomogeneous elastic layer*” under the supervision of Vladimir LAMZYUK. Grade: 5/5

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

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

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

4.1 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).*

<i>Section</i>	<i>Grade</i>	<i>Validity</i>	<i>Field</i>
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

4.2 Visits abroad

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

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

5 Other qualifications and skills

5.1 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
MESHES	GiD, GMSH
VISUALISATION	ParaView, OpenDX, MatLab, gnuplot
OFFICE	L ^A T _E X, OpenOffice, AbiWord

5.2 Foreign language skills

RUSSIAN	native language
UKRAINIAN	native language
FRENCH	excellent
ENGLISH	excellent
ITALIAN	basic knowledge

6 Research activities

6.1 Scientific interests

- Broadly, my scientific interests can be described by the following categories:
 - Fluid mechanics
 - * free surface flows
 - * models in shallow and deep waters
 - * variational methods & geometric mechanics
 - * water wave run-up
 - * compressible and two-phase flows
 - 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
 - Faraday instability:** Modelling and simulation of the Faraday waves in the Hele-Shaw cell using finite volume and spectral schemes
 - 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 modeling
- The present list can evolve depending on new contacts that I will make in the future.

6.2 Theses

6.2.1 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 modeling 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 introductory and contains also the 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 modeling. We investigate the complete range of physical processes from the 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 modeling of the inundation phenomena. This question is studied by 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 flows modeling. 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 obstacle are also presented.

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

6.2.2 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

6.3 List of present and past collaborators:

Céine Acary-Robert: Laboratoire de Mathématiques (LAMA), Université Savoie Mont Blanc, France

Sonya Beisel: Institute of Computational Technologies, Novosibirsk, Russia

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

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

Francesco Carbone: CNR-IIA, Institute of Atmospheric Pollution Research, U.O.S. di Rende, Italy

John D. Carter: Mathematics Department, Seattle University, USA

Marx Chhay: Laboratoire LOCIE UMR 5271, Polytech Annecy–Chambéry, France

Paul Christodoulides: Department of Electrical Engineering and Information Technology, Faculty of Engineering and Technology, Cyprus University of Technology, Limassol, Cyprus

Leonid Chubarov: Institute of Computational Technologies, Novosibirsk, Russia

Didier Clamond: Laboratoire J.A. Dieudonné, Université de Nice Sophia Antipolis, France

Raymond P. Coppinger: School of Cognitive Science, Hampshire College, Amherst, USA

Frédéric Dias: School of Mathematical Sciences, University College Dublin, Ireland

John M. Dudley: Institut FEMTO-ST, University of Franche-Comté, France

- Angel Duran:** Departamento de Matematica Aplicada, Universidad de Valladolid, Spain
- Gennady El:** Department of Mathematical Sciences, Loughborough University, UK
- Ramón Escobedo:** Centre de Recherche sur la Cognition Animale (CRCA UMR 5169), Toulouse, France
- Francesco Fedele:** School of Civil and Environmental Engineering, Georgia Institute of Technology, USA
- Zinaida Fedotova:** Institute of Computational Technologies, Novosibirsk, Russia
- André Galligo:** Laboratoire J.A. Dieudonné, Université de Nice Sophia Antipolis, France
- Ivan Gandzha:** Department of Theoretical Physics, Institute of Physics, Kiev, Ukraine
- Marguerite Gisclon:** Laboratoire de Mathématiques (LAMA), Université Savoie Mont Blanc, France
- Jean-Michel Ghidaglia:** Centre de Mathématiques et de Leurs Applications, Ecole Normale Supérieure de Cachan, France
- Bernard Gleyse:** Laboratoire de Mathématiques de l'INSA de Rouen, Rouen, France
- Laurent Gosse:** IAC–CNR — Istituto per le Applicazioni del Calcolo Mauro Picone, Bari, Italy
- Olivier Goubet:** Laboratoire Amiénois de Mathématique Fondamentale et Appliquée, Université de Picardie Jules Verne, France
- Vincent Guinot:** HydroSciences Montpellier, University of Montpellier, France
- Matthew Hunt:** Department of Mathematical Sciences, University of Bath, UK
- Adnan Ibrahimbegovic:** LMT, ENS de Cachan, France
- Boaz Ilan:** Applied Mathematics, School of Natural Sciences, UC Merced, USA
- Henrik Kalisch:** Department of Mathematics, University of Bergen, Norway
- Christophe Kassiotis:** (formerly at) Laboratoire d'hydraulique Saint-Venant, ENPC & EDF R&D Chatou, France
- Theodoros Katsaounis:** Department of Applied Mathematics, University of Crete, Greece
- Gayaz Khakimzyanov:** Institute of Computational Technologies, Novosibirsk, Russia
- Youen Kervella:** Open Ocean, Brest, France

Céine Labart: Laboratoire de Mathématiques (LAMA), Université Savoie Mont Blanc, France

Christian Lalanne: Irish Centre for High-End Computing (ICHEC), Dublin, Ireland

Michael Lysaght: Irish Centre for High-End Computing (ICHEC), Dublin, Ireland

Paul Milewski: Department of Mathematical Sciences, University of Bath, UK

Dimitrios Mitsotakis: School of Mathematics, Statistics and Operations Research, Victoria University of Wellington, New Zealand

Daulet Moldabayev: Department of Mathematics, University of Bergen, Norway

Cristina Muro: AEPA-Euskadi, Bilbao, Spain

Hayk Nersisyan: (formerly at) BCAM – Basque Center for Applied Mathematics, Bilbao, Spain

Laura O’Brien: Monash University, Melbourne, Australia

Efim Pelinovsky: Institute of Applied Physics, Nizhny Novgorod, Russia

Raphaël Poncet: (formerly at) CEA DAM, Ile-de-France, France

Ashkan Rafiee: Carnegie Wave Energy, Perth, Australia

Emiliano Renzi: Mathematical Sciences, Loughborough University, UK

Christian Ruyer-Quil: Laboratoire LOCIE UMR 5271, Polytech Annecy–Chambéry, France

Yuriy Sedletsky: Department of Theoretical Physics, Institute of Physics, Kiev, Ukraine

Yuri Shokin: Institute of Computational Technologies, Novosibirsk, Russia

Nina Shokina: Rechenzentrum, Albert-Ludwigs-Universität Freiburg, Germany

Lee Spector: School of Cognitive Science, Hampshire College, Amherst, USA

Themistoklis Stefanakis: (formerly at) CMLA, ENS de Cachan & School of Mathematical Sciences, University College Dublin, Ireland

Elena Tobisch (Kartashova): Institut für Analysis, Johannes Kepler Universität Linz, Austria

Claudio Viotti: (formerly at) School of Mathematical Sciences, University College Dublin, Ireland

Laurent Vuillon: Laboratoire de Mathématiques (LAMA), Université Savoie Mont Blanc, France

Enrique Zuazua: Departamento de Matemáticas, Universidad Autónoma de Madrid, Madrid, Spain

6.4 Publications

- My ERDŐS number: **3**
- Citations statistics:

<http://scholar.google.at/citations?user=cv0Vca4AAAAJ>

6.4.1 Various writings

- **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/>
- **D. Dutykh.** *Introduction into Hydrodynamics. Variational point of view.* Lecture notes (work in progress), 142 pp, 2015
<https://github.com/dutykh/hydro/>
- **D. Dutykh.** *My favourite books, papers and software libraries.* Informal notes (work in progress), 18 pp, 2015
<https://github.com/dutykh/libs/>
- **D. Dutykh.** *Mathematical exercises (with solutions).* Work in progress, 40 pp, 2015
<https://github.com/dutykh/exos/>

6.4.2 Preprints under review

- D. Clamond, **D. Dutykh** & D. Mitsotakis. *Conservative modified Serre–Green–Naghdi equations with improved dispersion characteristics*, Submitted, 2015
<https://hal.archives-ouvertes.fr/hal-01232370/>
- M. Chhay, **D. Dutykh**, M. Gisclon & Ch. Ruyer-Quil. *Asymptotic heat transfer model in thin liquid films*, Submitted, 2015
<https://hal.archives-ouvertes.fr/hal-01224182/>
- G. Khakimzyanov & **D. Dutykh.** *On supraconvergence phenomenon for second order centered finite differences on non-uniform grids*, Submitted, 2015
<https://hal.archives-ouvertes.fr/hal-01223522/>

- G. Khakimzyanov, **D. Dutykh**, D. Mitsotakis & N. Shokina. *Numerical solution of conservation laws on moving grids*, Submitted, 2015
<https://hal.archives-ouvertes.fr/hal-01223510/>
- **D. Dutykh**, D. Clamond & A. Durán. *Efficient computation of capillary-gravity generalized solitary waves*, Submitted, 2015
<https://hal.archives-ouvertes.fr/hal-01218989/>
- J.-G. Caputo, **D. Dutykh** & B. Gleyse. *Coupling conditions for the shallow water equations on a network*, Submitted, 2015
<https://hal.archives-ouvertes.fr/hal-01206504/>
- R. Escobedo, **D. Dutykh**, C. Muro, L. Spector & R.P. Coppinger. *Group size effect on the success of wolves hunting*. Submitted, 2015
<https://hal.archives-ouvertes.fr/hal-01182799/>
- **D. Dutykh** & J.-G. Caputo. *Discrete sine-Gordon dynamics on networks*, Submitted, 2015
<https://hal.archives-ouvertes.fr/hal-01160840/>
- **D. Dutykh** & E. Tobisch (Kartashova). *Resonance enhancement by suitably chosen frequency detuning*, Submitted, 2014
<http://hal.archives-ouvertes.fr/hal-01084796/>
- **D. Dutykh** & E. Tobisch (Kartashova). *Formation of the dynamic energy cascades in quartic and quintic generalized KdV equations*, Submitted, 2014
<http://hal.archives-ouvertes.fr/hal-01070799/>
- D. Mitsotakis, **D. Dutykh** & J. Carter. *On the nonlinear dynamics of the traveling-wave solutions of the Serre equations*, Submitted, 2014
<http://hal.archives-ouvertes.fr/hal-00984035/>
- L. Vuillon, **D. Dutykh** & F. Fedele. *Some special solutions to the Hyperbolic NLS equation*. Submitted, 2013
<http://hal.archives-ouvertes.fr/hal-00846801/>
- **D. Dutykh** & D. Clamond. *Modified Shallow Water Equations for significantly varying bottoms*. Submitted, 2013
<http://hal.archives-ouvertes.fr/hal-00675209/>

6.4.3 International peer-reviewed journals

- **D. Dutykh** & O. Goubet. *Derivation of dissipative Boussinesq equations using the Dirichlet-to-Neumann operator approach*, Math. Comput. Simul., *In Press*, 2015
<http://hal.archives-ouvertes.fr/hal-00596804/>

- M. Chhay, **D. Dutykh** & D. Clamond. *On the multi-symplectic structure of the Serre–Green–Naghdi equations*, J. Phys. A: Math. Theor., **49**, 03LT01, 2016
<https://hal.archives-ouvertes.fr/hal-01221356/>
- G. Khakimzyanov, N. Shokina, **D. Dutykh** & D. Mitsotakis. *A new run-up algorithm based on local high-order analytic expansions*, J. Comp. Appl. Math., **298**, 82–96, 2016
<http://hal.archives-ouvertes.fr/hal-01084811/>
- A. Rafiee, **D. Dutykh** & F. Dias. *Numerical simulation of wave impact on a rigid wall using a two-phase compressible SPH method*. Procedia IUTAM, **18**, 123–137, 2015
<http://hal.archives-ouvertes.fr/hal-00830054/>
- D. Clamond, **D. Dutykh** & A. Durán. *A plethora of generalised solitary gravity-capillary water waves*, J. Fluid Mech., **784**, 664–680, 2015
<http://hal.archives-ouvertes.fr/hal-01081798/>
- H. Nersisyan, **D. Dutykh** & E. Zuazua. *Generation of two-dimensional water waves by moving bottom disturbances*. IMA J. Appl. Math., **80**(4), 1235–1253, 2015
<http://hal.archives-ouvertes.fr/hal-00752364/>
- D. Moldabayev, H. Kalisch & **D. Dutykh**. *The Whitham equation as a model for surface water waves*, Phys. D, **309**, 99–107, 2015
<http://hal.univ-savoie.fr/hal-01136855/>
- **D. Dutykh**, D. Clamond & D. Mitsotakis. *Adaptive modeling of shallow fully nonlinear gravity waves*, RIMS Kôkyûroku, **1947**, 45–65, 2015
<https://hal.archives-ouvertes.fr/hal-01088440/>
- **D. Dutykh**, D. Clamond & M. Chhay. *Numerical study of the generalised Klein–Gordon equations*, Phys. D, **304–305**, 23–33, 2015
<http://hal.archives-ouvertes.fr/hal-00851030/>
- **D. Dutykh** & E. Tobisch (Kartashova). *Direct dynamical energy cascade in the modified KdV equation*, Phys. D, **297**, 76–87, 2015
<http://hal.archives-ouvertes.fr/hal-00990724/>
- T. Stefanakis, S. Xu, **D. Dutykh** & F. Dias. *Run-up amplification of transient long waves*. Quart. Appl. Math., LXXIII(1), 177–199, 2015
<http://hal.archives-ouvertes.fr/hal-00768597/>
- I. S. Gandzha, Yu. V. Sedletsky & **D. Dutykh**. *High-order nonlinear Schrödinger equation for the envelope of slowly modulated gravity waves on the surface of finite-depth fluid and its quasi-soliton solutions*. Ukr. J. Phys., **59**(12), 1201–1215, 2014
<https://hal.archives-ouvertes.fr/hal-01084747/>

- **D. Dutykh** & E. Pelinovsky. *Numerical simulation of a solitonic gas in some integrable and non-integrable models*, Phys. Lett. A, **378**(42), 3102–3110, 2014
<http://hal.archives-ouvertes.fr/hal-00913960/>
- J.-G. Caputo & **D. Dutykh**. *Nonlinear waves in networks: a simple approach using the sine–Gordon equation*, Phys. Rev. E, **90**, 022912, 2014
<http://hal.archives-ouvertes.fr/hal-00951705/>
- D. Mitsotakis, B. Ilan & **D. Dutykh**. *On the Galerkin / finite-element method for the Serre equations*. J. Sci. Comp., **61**(1), 166–195, 2014
<http://hal.archives-ouvertes.fr/hal-00834064/>
- **D. Dutykh** & E. Tobisch (Kartashova). *Observation of the Inverse Energy Cascade in the modified Korteweg–de Vries Equation*, Eur. Phys. Lett., **107**, 14001, 2014
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6.4.4 Book chapters

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- D. Clamond & **D. Dutykh**. *A Non-Hydrostatic Non-Dispersive Shallow Water Model*, Ph. Gouberville *et al.* (Eds.): Springer Hydrogeology. *Advances in Hydroinformatics: SIMHYDRO 2012 — New Frontiers of Simulation*, 197–206, Springer Singapore 2014
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- **D. Dutykh** & F. Dias. *How does sedimentary layering affect the generation of tsunamis?* Proceedings of OMAE 2009, 28th International Conference on Ocean, Offshore and Arctic Engineering, May 31 – June 5, 2009, Honolulu, USA
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- F. Dias, **D. Dutykh** & J.-M. Ghidaglia. *Simulation of Free Surface Compressible Flows Via a Two Fluid Model*, OMAE 2008, Nick Newman Symposium on Marine Hydrodynamics. Estoril, Portugal, 15 – 20 June 2008
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6.4.6 Proceedings

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- **D. Dutykh** & J.-G. Caputo. *Sine-Gordon dynamics on graphs*. In O.O. Kochubey *et al.* (Eds.), Applied problems of the fluid mechanics and heat and mass transfer (pp. 29–31). Dnipropetrovsk, Dnipropetrovsk National University. pp 192, 2014
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- **D. Dutykh**, D. Mitsotakis, S. Beisel & N. Shokina. *On waves generated by an underwater landslide*. In Proceedings of the IV Conference “Applied Problems of the fluid mechanics, heat and mass transfer”, 1 – 3 November 2012, Dnepropetrovsk, Ukraine, pp. 75–79, 2012.
- D. Clamond & **D. Dutykh**. *A non-hydrostatic non-dispersive shallow water model*. Proceedings of SimHydro 2012 Conference, September 12 – 14, Sophia-Antipolis – Nice, France
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6.4.7 Research reports

- **D. Dutykh** & L. Gosse. *Some topics of the NumHyp–2015’ discussion session*. 25 pp., 2015
<http://www.dmi.unict.it/NumHyp2015/Discussion-NumHyp-2015.pdf>

- Ch. Lalanne, A. Rafiee, **D. Dutykh**, M. Lysaght & F. Dias. *Enabling the UCD-SPH code on the Xeon Phi*, 12 pp., 2014
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- F. Dias, **D. Dutykh** & J.-M. Ghidaglia. *A compressible two-fluid model for the finite volume simulation of violent aerated flows. Analytical properties and numerical results*, 2009
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6.4.8 Book reviews

- M. S. Howe, *Hydrodynamics and Sound*, Cambridge University Press, Cambridge (2007). *European Journal of Mechanics - B/Fluids*, **27(2)**, 218, 2008

6.4.9 Theses

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- **D. Dutykh**. *Mathematical modeling of tsunami waves*, PhD thesis, CMLA, ENS de Cachan, 2007
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- **D. Dutykh**. *Moving load on a layered floating ice sheet*, Master 2 MN2MC thesis, CMLA, ENS de Cachan, 2005
- **D. Dutykh**. *Harmonic oscillations of an inhomogeneous elastic layer*, Master thesis, Faculty of Applied Mathematics, National University of Dnepropetrovsk, Ukraine, 2004

6.4.10 General audience articles

- [A dive into tsunami — the terrifying energy it possesses! Scrivial.com](#), 2015
- C. Acary-Robert, D. Bresch & **D. Dutykh**. *Simulation d'avalanches de neige*. *Actualités scientifiques de l'INSMI (CNRS)*, 14 mars 2012
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- *Tsunamis: gare aux “avalanches” et à la deuxième vague*. *Le Monde*, 1^{er} Octobre 2011
- *New research may explain high runup from tsunami waves*. *PhysicsCentral*, Blog of the American Physical Society. September, 19, 2011
- *Tsunami Puzzle Explained*. *Physical Review Focus*, 16 September 2011
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- *Tuned into Earth*. *CNRS International Magazine*, **21**, April 2011
- *Quelle est la différence entre un tsunami et un raz-de-marée?*, *Slate.fr*, 24 mars 2011
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- *Les maths à l’écoute de la Terre*. *Le Journal du CNRS*, N° 245, juin 2010
- *Simuler une avalanche*. *La Recherche* N428 – Avril 2009
- *Springy sediments may amplify tsunamis*. Issue 2662 of *New Scientist magazine*, 25 June 2008, page 20
- *Comment naît un tsunami?*, *Le Mensuel de l’Université*, N° 23, Février 2008

6.5 Referee activities

6.5.1 International Journals

- [Scientific Reports](#)
- [Journal of Fluid Mechanics](#)
- [Journal of Computational Physics](#)
- [Journal of Engineering Mathematics](#)
- [Theoretical and Computational Fluid Dynamics](#)
- [Journal of Nonlinear Science](#)
- [Applied Ocean Research](#)

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- Journal of Waterway, Port, Coastal, and Ocean Engineering
 - Applied Mathematical Modelling
 - Applied Mathematics and Computation
 - Computers and Mathematics with Applications
 - Numerical Algorithms
 - Communications in Nonlinear Science and Numerical Simulation
 - Communications on Pure and Applied Analysis
 - Comptes Rendus Mécanique
 - European Journal of Mechanics - B/Fluids
 - Mathematics and Computers in Simulation
 - Numerische Mathematik
 - Ocean Engineering
 - Ocean Modelling
 - Journal of Ocean Engineering and Marine Energy
 - Physics Letters A
 - SIAM Journal on Applied Mathematics
 - Wave Motion
 - Natural Hazards and Earth System Sciences
 - 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

6.5.2 International Conferences

- [FVCA VII](#)
- [FVCA VI](#)
- [ISOPE 2010](#)
- [ICTAM 2008](#)
- [ISOPE 2007](#)
- [FVCA V](#)

6.5.3 Book proposals

- [Springer Science](#)

6.5.4 Calls for proposals

- [Marie Curie COFUND](#)
- [Cluster Environnement Rhône-Alpes \(Projet 2: Risques gravitaires, séismes\)](#)
- [Service de coopération universitaire et scientifique, Ambassade de France en Ukraine](#)
- [Oregon Sea Grant](#)

6.6 Delivered talks

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

6.6.1 International conferences

- *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^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

6.6.2 Workshops

- *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, 16th 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*. 2nd 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 & 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

6.6.3 National conferences

- *Numerical simulation of dispersive waves*, 29 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 May 2008, Vendée, France

6.6.4 Seminars

- *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 & 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 & 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 A³, 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

6.6.5 Short courses

- *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/>

6.6.6 General audience lectures

- *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

6.7 Software development

- Public GitHub repository:
<https://github.com/dutykh/>
- 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 recasted 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/>
- 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 & 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 2nd order in space and time. The implicit-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*” (1st 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 preprints:
 - D. Clamond & **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** & 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/>

6.8 Scientific meetings organization

- 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 & 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/mathfoceans/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 DURAN, 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, Frédéric 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 [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 DESVILLETES, Florian DE VUYST, Frédéric DIAS, Denys DUTYKH, Cédric ÉNAUX, Christophe FOCESATO, 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 REAUD, Jean-Michel ROVARCH, Gérald SAMBA, Muriel SESQUES, Vincent SIESS

6.9 Research projects

6.9.1 ANR projects

ANR = [Agence Nationale de la Recherche](#)

- Project **MathOcéan** (2009 – 2012) : “*Analyse mathématique en océanographie et applications*”. Project leader: D. LANNES (DMA, ENS Paris)
- Project **HEXECO** (2007 – 2010) : “*Hydrodynamique extrême du large à la côte*”. Project leader: O. KIMMOUN (Ecole Centrale Marseille)

6.9.2 International cooperation projects

- **LEA Math Mode** (Laboratoire Européen Associé CNRS Franco–Roumain Mathématiques & Modélisation) project “*A variational approach to water waves in shallow waters*”. Cooperation with Dr. Delia IONESCU-KRUSE (IMAR, Bucharest, Romania)
- French–Russian cooperative project (**Convention d’échange**) N° EDC26179 “*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 highly 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 – 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)

6.9.3 Other projects

- 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)

7 Teaching and supervision activities

7.1 Teaching

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”

7.2 Students supervision

7.2.1 PhD students

- 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*”. Defence is expected to be during 2015.
- 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

7.2.2 Post-docs

- 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*”
- Francesco CARBONE (September 2012 – August 2013): Co-supervision with F. DIAS, ERC MULTIWAVE Project funding. Research topic: “*Wave focussing effect in various physical systems*”

7.2.3 Master 2 students

- Yannick MEYAPIN (March – July 2010) (University of Savoie): Co-supervision with M. GISCLON (LAMA, University of Savoie). Subject: “*Numerical simulation of single-velocity two-phase flows*”
- Ahmed Ossama GHANEM (March – July 2010) (University of Haute Alsace): Co-supervision with M. GISCLON (LAMA, University of Savoie) and J. RAJCHENBACH (LPMC, University of Nice Sophia-Antipolis). Subject: “*Numerical simulation of the Faraday instability*”
- 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): Co-supervision with F. DIAS. Subject: “*Comparison between linear and nonlinear models of tsunami generation*”

7.2.4 Master 1 students

- 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*”

7.2.5 Other students

- 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*”

7.3 PhD thesis commissions

- (referee) 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. Advisors: Christian KHARIF & Olivier KIMMOUN
- (examinator) 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. Advisors: Didier CLAMOND & Marc FRANCIUS
- (examinator) Georges SADAKA: PhD thesis title: “*Étude Mathématique et numérique d’équations d’ondes aquatiques amorties*”, November 25, 2011, LAMFA, University of Picardie Jules Verne. Advisor: Jean-Paul CHEHAB
- (examinator) 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. Main advisor: Etienne WURTZ
- (examinator) Marx CHHAY: PhD thesis title: “*Intégrateurs géométriques: Application à la Mécanique des Fluides*”, December 16, 2008, LEPTIAB, University of La Rochelle. PhD advisors: Aziz HAMDOUNI & Pierre SAGAUT

8 Responsibilities

8.1 Administrative Responsibilities

- 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 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
 - Thermics (section 62), LOCIE, University of Savoie

8.2 Professional memberships

- [Société de Mathématiques Appliquées et Industrielles \(SMAI\)](#) (2007 – 2012)
- [Société Mathématique de France \(SMF\)](#) (2008 – 2012)
- [The European Mathematical Society \(EMS\)](#) (2008 – 2012)
- [GDR CNRS 2948: Groupement de Recherche MOAD](#) (2005 – 2009):
MOdélisation, Asymptotique, Dynamique non-linéaire

8.3 Seminars

During past years I actively participated in running following seminars:

2008 – 2012: [Seminar of the team EDPs²](#), LAMA, University of Savoie. Participation, invitation of speakers

2004 – 2008: [Working group: Mécanique des Fluides Réels](#), Centre de Mathématiques et de Leurs Applications (CMLA), ENS de Cachan

8.4 General audience events

- Stand on tsunami waves (together with Professor Christian BECK, [LGCA](#), University of Savoie) at the **Fête de la Science 2009**, Galerie 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

9 Other interests

SPORTS		cycling, skiing, bodybuilding, badminton
HOBBIES		reading, photography, tourism

10 Academic references

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