

## Mihaela Ifrim

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### CONTACT INFORMATION

Department of Mathematics  
University of Wisconsin, Madison  
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### RESEARCH INTERESTS

Nonlinear Wave and Dispersive Equations, Fluid Mechanics & Harmonic Analysis.

### PROFESSIONAL APPOINTMENTS

- *Associate Professor*, Department of Mathematics, University of Wisconsin, Madison, August 2020 - present
- *Clare Boothe Luce Assistant Professor*, Department of Mathematics, University of Wisconsin, Madison, August 2017 - August 2020
- *Simons Postdoctoral Scholar - University of California at Berkeley*, Department of Mathematics, January 2014 - August 2017
  - Postdoctoral Advisor: Daniel Tataru
- *Postdoctoral Fellow - Canada Research Chair Postdoctoral Fellowship*, McMaster University, Department of Mathematics and Statistics; Sept. 2012 - Dec. 2013
  - Postdoctoral Advisor: Walter Craig

### EDUCATION

**Ph.D. in Mathematics**, Department of Mathematics, University of California at Davis, CA, USA, 2012

- Thesis Topic: *Normal Form Transformations for Quasilinear Wave Equations*
- Ph.D. Advisor: Professor John K. Hunter

**M.S.**, Institute of Mathematics Simion Stoilow of the Romanian Academy, Bucharest, Romania, 2006 - 2007

**B.S.**, Faculty of Mathematics and Computer Science, University of Bucharest, Program: Advanced Studies Research Group, Bucharest, Romania, 2002 - 2006

### ACADEMIC VISITS

- *Simons Visiting Professorship* for the duration of the Mathematical Sciences Research Institute program “Mathematical problems in fluid dynamics”, January - May 2021, Berkeley, California
- *Visiting Scholar*, Department of Mathematics, UC Berkeley, collaborative visit January - May 2020, Berkeley, California
- *University of Bonn collaborative visit*, Mathematics Department, April 1 - 30, June 16 - 29, 2018 May 11 - 20, 2019, January 10 - 20, 2020, Bonn, Germany
- *ENS Cachan visiting Professor*, collaborative visit May 1 - June 11, 2018, France
- *University of Paris Sud visiting Professor*, Mathematics Department, collaborative visit, University of Paris-Sud Orsay, March 15 - 30, 2018, France
- *Visiting Member* at Institut des Hautes Études Scientifiques (IHES) in “Nonlinear Waves” trimester, May - July 2016
- *Research Member* at Mathematical Sciences Research Institute (MSRI)

- ~ New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems from August 17, 2015 - December 18, 2015
- ~ Mathematical General Relativity program, from October 1st to November 31st, 2013
- *Research Member* in Hausdorff Trimester Program: Harmonic Analysis and Partial Differential Equations, Bonn, Germany, May 20 - August 22, 2014.

## HONORS AND AWARDS

- *Visiting Miller Professorship Award*, Miller Institute in Science, University of California Berkeley Fall 2023
- *Simons Fellows in Mathematics*, Simons Foundation Spring 2023
- *Sloan Research Fellowship*, Alfred P. Sloan Foundation 2019 - 2021
- *NSF CAREER award*, DMS-1845037 2019 - 2024
- *UW Madison 2018 Fall Research Competition Award* Deferred
- *Honored Instructor Award*, University of Wisconsin-Madison Fall 2018
- *Clare Luce Boothe Professorship* 2017 - 2022
- *Hilldale Undergraduate/Faculty Research Fellowship*, 2020 - 2021
- *Clay Mathematics Institute* travel award for *IHES Summer School on Non-linear Waves*, Bures-sur-Yvette, France, July 18 - 29, 2016
- *William Karl Schwarze Scholarship in Mathematics*, Department of Mathematics, University of California at Davis, Spring 2010-*for research and teaching achievements*
- *Alice Leung Scholarship in Mathematics*, Department of Mathematics, University of California at Davis, Spring 2009 - *for research achievements*
- *Travel Awards*, Department of Mathematics, University of California at Davis, Fall 2010, Fall 2011

## PUBLICATIONS

1. Long time solutions for 1D cubic dispersive equations, Part II: the focusing case M. Ifrim, D. Tataru, <https://arxiv.org/abs/2210.17007>, (18 pages), submitted 2022
2. Global solutions for 1D cubic defocusing dispersive equations: Part I, M. Ifrim, D. Tataru, <https://arxiv.org/pdf/2205.12212.pdf>, (43 pages), submitted 2022
3. Testing by wave packets and modified scattering in nonlinear dispersive pde's, M. Ifrim, D. Tataru, <https://arxiv.org/pdf/2204.13285.pdf>, (37 pages), submitted 2022
4. The time-like minimal surface equation in Minkowski space: low regularity solutions, A. Ai, M. Ifrim, and D. Tataru, <https://arxiv.org/abs/2110.15296>, (119 pages), submitted 2021
5. The Benjamin-Ono approximation for 2D gravity water waves with constant vorticity, M. Ifrim, J. Rowan, D. Tataru, L. Wan, <https://arxiv.org/pdf/2108.08964.pdf>, **Ars Inveniendi Analytica**, (31 pages), 2021
6. No pure capillary solitary waves exist in 2D finite depth, M. Ifrim, B. Pineau, D. Tataru, & M. Taylor, **SIAM J. Math. Anal.**, Vol. 54, No. 4, pp. 4452 - 4464, 2021
7. Two dimensional gravity waves at low regularity II: Global solutions, A. Ai, M. Ifrim, D. Tataru, accepted in **Annales IHP**, (57 pages), 2021

8. Local well-posedness for quasilinear problems: a primer, M. Ifrim and D. Tataru, accepted in **Bull. of the Amer. Math. Soc.**, (21 pages), 2022
9. The relativistic Euler equations with a physical vacuum boundary: Hadamard local well-posedness, rough solutions, and continuation criterion, M. Disconzi, M. Ifrim, and D. Tataru, accepted in **Arch. Ration. Mech. Anal.**, (48 pages), 2021
10. The compressible Euler equations in a physical vacuum: a comprehensive Eulerian approach, M. Ifrim and D. Tataru, preprint at <https://arxiv.org/abs/2007.05668>, (79 pages), 2020
11. Almost global well-posedness for quasilinear strongly coupled wave-Klein-Gordon systems in two space dimensions, M. Ifrim, A. Stingo, <https://arxiv.org/abs/1910.12673>, (52 pages), 2019
12. Two dimensional gravity waves at low regularity I: Energy estimates, A. Ai, M. Ifrim, D. Tataru, preprint at <https://arxiv.org/abs/1910.05323>, (61 pages), 2019
13. A Morawetz inequality for gravity-capillary water waves at low Bond number, T. Alazard, M. Ifrim, D. Tataru, **Water Waves**, <https://arxiv.org/pdf/1910.02529.pdf>, (33 pages), 2020
14. Dispersive decay of small data solutions for the KdV equation, M. Ifrim, H. Koch, D. Tataru, accepted in **Annales scientifiques de l'École normale supérieure**, (41 pages), 2020
15. The NLS approximation for two dimensional deep gravity waves, M. Ifrim, D. Tataru, **Sci. China Math**, 62, no 6, 1101-1120, 2019
16. No solitary waves in 2-d gravity and capillary waves in deep water, M. Ifrim, D. Tataru, **Nonlinearity**, 33, no. 10, 5457-5476, 2020
17. A Morawetz inequality for water waves, T. Alazard, M. Ifrim, D. Tataru, accepted in **Amer. J. Math**, (71 pages), 2021
18. Well-posedness and dispersive decay of small data solutions for the Benjamin-Ono equation, M. Ifrim, D. Tataru, **Annales scientifiques de l'ENS**, 4 (52), no 2, 297-335, 2019
19. Finite depth gravity water waves in holomorphic coordinates, B. Harrop-Griffiths, M. Ifrim, D. Tataru, **Ann. PDE**, 3, (102 pages), no 1, 2017
20. Two dimensional gravity water waves with constant vorticity: I. Cubic lifespan, M. Ifrim, D. Tataru, **Analysis & PDE**, 12, no 4, 903-967, 2019
21. The lifespan of small data solutions to the KP-I, B. Harrop-Griffiths, M. Ifrim, D. Tataru, **Int. Math. Res. Not.**, no 1, 1-28, 2017
22. The lifespan of small data solutions in two dimensional capillary water waves, M. Ifrim, D. Tataru, **Arch. Ration. Mech. Anal.**, 225(3), 1279 - 1346, 2017
23. Two dimensional water waves in holomorphic coordinates II: global solutions, M. Ifrim, D. Tataru, **Bull. Soc. Math. France**, 144, no 2, 369-394, 2016
24. Global bounds for the cubic nonlinear Schrödinger equation (NLS) in one space dimension, M. Ifrim, D. Tataru, **Nonlinearity** 28, no. 8, 2661-2675, 2015
25. Two dimensional water waves in holomorphic coordinates, J. K. Hunter, M. Ifrim, D. Tataru, **Comm. Math. Phys.**, 346, no. 2, 483-552, 2016

26. A modified energy method proving enhanced lifespan of smooth solutions of a Burgers-Hilbert equation, J. K. Hunter, M. Ifrim, D. Tataru, D. T. Wang, **Proceedings of the AMS**, Vol. 143(8), pp. 3407-3412, 2015
27. Enhanced lifespan of smooth solutions of a Burgers-Hilbert equation, J. K. Hunter, M. Ifrim, **SIAM J. on Math. Anal.**, Vol 44(3), pp. 1279-2235, 2012
28. A quasilinear Schrödinger equation, large amplitude inertial oscillations in a rotating shallow fluid, J. K. Hunter, M. Ifrim, **IMA J. of Applied Mathematics**, Vol. 78(4), pp. 762-776, 2013

ACADEMIC  
SERVICE

- Co-organizer of the one month research gathering: **MSRI** program ‘Mathematical problems in fluid dynamics’ during Summer 2023 - upcoming
- Co-organizer of the **BIRS** workshop **Women in nonlinear dispersive PDEs**, February 5 - February 10, 2022 - upcoming
- Co-organizer of the **Oberwolfach Seminar: Free Boundary Problems in Fluid Dynamics**, October 23 - October 30, 2022
- Invited speaker: **Summer School 2022: Geometric dispersive PDEs**, Obergurgl, Austria - September 25 - September 29 2022
- Co-organizer of the *PDE Geometric Analysis seminar*, Madison, 2021 - current
- Co-organizer of the **PDE VIRTUAL research seminar**, UC Berkeley-UW Madison, 2020 - ongoing
- Co-organizer of the *Water waves and other interface problems seminar* during the **MSRI** program, January - May 2021
- Co-organizer of the **MSRI** program ‘Mathematical problems in fluid dynamics’ during Spring 2021: <http://www.msri.org/programs/327>
- Co-organizer of the **MSRI** conference ‘Introductory Workshop: Mathematical problems in fluid dynamics’ during Spring 2021: <https://www.msri.org/workshops/945>
- Co-organizer of the **MSRI** conference ‘Recent Developments in Fluid Dynamics’ during Spring 2021: <https://www.msri.org/workshops/950>
- Co-organizer of the *Celebration of Women in Mathematics* at **MSRI**, May 2021
- Co-organizer of the graduate summer school at **MSRI: Introduction to water waves**, 2020
- Co-organizer of the **AMS** Sectional: ‘Nonlinear Dispersive Equations and Water Waves’, University of Wisconsin, Madison, September 14-15, 2019
- Association for Women in Mathematics Mentor for the Joint Mathematics Meetings, San Diego, CA, January 10 - 13, 2018
- Co-organizer Putnam Club since 2017 - 2022. Chair of the Putnam Club in 2018-2019 when we ranked 14th nationwide. This was the best result obtained by UW Madison in the last 12 years.

RECENT  
PRESENTATIONS  
AND  
CONFERENCES

- **Oberwolfach Seminar** : *Free Boundary Problems in Fluid Dynamics*, Oberwolfach, Germany, 23 October - 29 October 2022
- *Summer School: Geometric dispersive PDEs*, invited lecturer, Obergurgl (Tirol), Austria, September 26- October 1, 2022
- **Harmonic Analysis and Waves** conference celebrating Hart Smith 60th birthday, University of Washington, Seattle, August 10-12, 2022

- **Oberwolfach Workshop:** *Nonlinear Waves and Dispersive Equations*, Oberwolfach, Germany, June 26 - July 2, 2022
- *Nonlinear PDEs in Fluid Dynamics*, Luminy, France, May 2022
- **Colloquium Berkeley**, UC Berkeley, April 14, 2022
- **Virtual Analysis and PDE Seminar (VAPS)**, Columbia Univ., 03/23, 2022
- **Shanks Workshop** on Mathematical Aspects of Fluid Dynamics, one of the principal speakers, Vanderbilt University on February 19-20, 2022
- **Joint Caltech-UCLA-USC Analysis and PDE Seminar**, February 8th 2022
- *AMS sectional meeting*, Creighton University in Omaha, Nebraska, Oct. 9-10, 2021
- *Brown PDE Seminar*, virtual talk, Brown University, March 12th 2021
- *MSRI Seminar: Water Waves and Other Interface Problems*, virtual talk, MSRI, Berkeley, CA, February 16th, 2021
- *University College London and Imperial College joint seminar*, virtual talk, February 12th, 2021
- *Harmonic Analysis and Differential Equations Seminar*, virtual talk, University of California, Berkeley, CA, December 1, 2020
- *PDE seminar*, University of Rochester, virtual talk, October 16th, 2020
- *MU-MST Analysis Seminar*, Mathematics and Statistics Missouri S&T, virtual talk, October 23rd, 2020
- *Conservation laws and nonlinear wave equations* at the AMS Fall Eastern Sectional Meeting, virtual talk, Pennsylvania State University, State College, PA, Oct. 3-4, 2020
- *Shanghai PDE seminar*, Shanghai, virtual talk, August 27th, 2020, deferred
- Oberwolfach Workshop: *Nonlinear Waves and Dispersive Equations*, Oberwolfach, Germany, May 24-30, 2020 (rescheduled for 2022)
- *Analysis & PDE*, Stanford, virtual talk, CA, April 17th, 2020
- *AMS Sectional Meeting, Evolution Equations and Applications*, Vanderbilt University, Nashville, TENN, April 14-15, 2020 (rescheduled for 2021)
- Analysis and PDE Seminar, University of California, Berkeley, CA, February, 2020
- *Dynamics in Geometric Dispersive Equations and the Effects of Trapping, Scattering and Weak Turbulence*, Banff International Research Station, Banff, Canada, February 2-7, 2020
- *PDE Seminar*, University of Bielefeld, Germany, January 17th, 2020
- *PDE Seminar*, University of Bonn, Germany, January 14th, 2020
- *Cornell Colloquium*, Cornell University, Ithaca, NYU, November 13-16, 2019
- *CAM Colloquium*, Penn State University, University Park, PA, Nov. 10-12, 2019
- *SCAPDE (Southern California Analysis and PDE) conference*, University of California San Diego, San Diego, CA, November 2-3, 2019
- *PDE Seminar*, Vanderbilt University, Nashville, TENN, October 17-20, 2019
- *Duke Colloquium*, Duke University, Durham, NC, October 15-17, 2019
- AMS Meeting Madison, Special Session on Wave Phenomena in Fluids and Relativity, Madison, Wisconsin, September 14-15, 2019

- Oberwolfach Workshop: *Mathematical Theory of Water Waves*, Oberwolfach, Germany, July 14-20, 2019
- Dispersive Wave and related topics conference in honour of Gilles Lebeau, Bergen, Norway, June 17-21, 2019
- Nonlinear Dispersive Waves, Solitons and related topics, Mittag-Leffler, Sweden, June 10-14, 2019
- Workshop on Nonlinear Dispersive Partial Differential Equations and Inverse Scattering, Fields Institute, Toronto, Canada, May 21-24, 2019
- Follow-Up-Workshop to Trimester Program *Harmonic Analysis and PDE*, Hausdorff Institute, Bonn, Germany, May 6-10, 2019
- 7th Midwest Women in Math Symposium, University of Iowa, April 11-13, 2019
- Conference in the honour of Prof. Chemin: *Les 60 ans de Jean-Yves Chemin*, Institut Henri Poincaré, Paris, France, March 25-29, 2019
- Analysis and PDE Seminar, University of California, Berkeley, March 4th, 2019
- PDE and Applied Math Seminar, University of California, Davis, March 1st, 2019
- Oberwolfach Workshop: *Nonlinear Evolution Equations: Analysis and Numerics*, Oberwolfach, Germany, February 3-9, 2019
- Workshop on Recent Developments in Nonlinear Waves at University of Illinois at Chicago, Illinois, November 9 -12, 2018
- INdAM Meeting “Linear and Nonlinear Wave Phenomena: Stability, Propagation of Regularity and Turbulence”, Cortona, Italy, September 10-14, 2018
- Lund Workshop on Fluid Dynamics and Dispersive Equations, June 25-29, 2018
- Analyse asymptotique des équations aux dérivées partielles d’évolution, Florence, Italy, Mai 7-11, 2018
- PDE Seminar, University of Paris-Sud Orsay, March 29th 2018
- Joint Mathematics Meetings, San Diego Convention Center and Marriott Marquis San Diego Marina, San Diego, CA, January 10-13, 2018
- SIAM Conference on Analysis of Partial Differential Equations, The Baltimore Convention Center, Baltimore, Maryland, USA, December 9-12, 2017
- PDE Geometric Analysis seminar, University of Wisconsin, Madison, Sept. 11, 2017
- CIRM: Asymptotic Analysis of Evolution Equations, Luminy, France July 3-7, 2017
- Oberwolfach Workshop: Nonlinear Waves and Dispersive Equations, 06/11-17/2017
- Summer School and Workshop: Mathematical Analysis of Water Waves and Related Models, Bodega Marine Laboratory, Bodega Bay, CA, June 5-9, 2017
- Analysis and PDE seminar, University of Wisconsin, Madison, January 13-14, 2017
- Joint Mathematics Meetings AMS Special Session, AMS Special Session on Recent Progress on Nonlinear Dispersive and Wave Equations, January 4-7, 2017
- Colloquium, University of California at Santa Barbara, November 30th, 2016
- AMS Fall Southeastern Sectional Meeting, North Carolina State University, Raleigh, NC , November 12-13, 2016
- Theoretical and Computational Aspects of Nonlinear Surface Waves, Banff, Canada, October 30-November 4, 2016

- Analysis and PDEs Seminar, University at Paris-Nord, July 13th, 2016
- One trimester long program: Nonlinear Waves, IHES, June 9, 2016
- Nonlinear Evolution Problems, Oberwolfach Workshop, Oberwolfach, Germany, May 29 - June 4, 2016
- International Conference on Evolution Equations in conjunction with the 31st annual Shanks Lecture, Vanderbilt University, during May 16-20, 2016
- Analysis of PDE's of Fluid Mechanics Workshop, Rice University, Houston, TX, May 9 - May 11, 2016
- Colloquium, University of Southern California, California, April 25, 2016
- Analysis and PDEs Seminar, UC Santa Barbara, California, March 11, 2016
- 34th Annual Western States Mathematical Physics Meeting, Caltech, Feb. 15, 2016
- Special Seminar, North Carolina State Univ., NC State University, Jan. 19, 2016
- Colloquium, University of Miami, Miami, January 14, 2016
- SIAM Conference on Analysis of Partial Differential Equations, Scottsdale, Arizona, December 7-10, 2015
- Colloquium, University of North Carolina at Chapel Hill, December 1, 2015
- Postdocs Seminar- MSRI associated to the program: New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems, November 13, 2015
- Fifth Abel Conference: Celebrating the Mathematical Impact of John F. Nash Jr. and Louis Nirenberg, IMA, Minnesota, November 02-04, 2015
- Shocks, Singularities and Oscillations in Nonlinear Optics and Fluid Mechanics, IN-DAM, Rome, Italy, September 14-15, 2015
- AMS Sectional Meeting AMS Special Session, Spring Eastern Sectional Meeting, Georgetown University, Washington, DC March 7-8, 2015
- AMS Sectional Meeting AMS Special Session, Spring Western Sectional Meeting, University of Nevada, Las Vegas, Las Vegas, NV, April 18-19, 2015
- University of California at Berkeley, Analysis and PDE Seminar, April 27, 2015
- University of Illinois at Urbana-Champaign, Harmonic Analysis and Differential Equations, Department of Mathematics, IL, February 17, 2015
- University of California, Los Angeles, Analysis and PDE Seminar, February 13, 2015
- Workshop: Harmonic Analysis Methods in Dispersive PDEs, Hausdorff Institute, Bonn, Germany, June 10-13, 2014
- Luce Postdoctoral Fellow, **Albert Ai**, Univ. of Wisconsin, Madison, August 2019 - ongoing
- Simons Mentor (Postdoctoral Mentor) for **Annalaura Stingo**, Univ. of California, Davis, June 2019 - June 2021

#### POSTDOCTORAL FELLOWS

#### GRADUATE STUDENTS

- Allison Byars (current third year Ph.D student), Univ. of Wisconsin, Madison.
- Lizhe Wan (current third year Ph.D student), Univ. of Wisconsin, Madison.
- Honging Huang (current first year Ph.D student), Univ. of Wisconsin, Madison.

DEPARTMENTAL  
COMMITTEES AND  
OTHER SERVICE

1. OVCRGE Research Committee member (served as a member of the award committee for the *Fall competition*, and *Villas Associates research awards*), UW Madison, 2019-2023
2. Hildale/Hoslstrom Physical Sciences Committee, chair, UW Madison, 2022-2023
3. Hildale/Hoslstrom Physical Sciences Committee member, UW Madison, 2019-2022
4. Hiring Committee, Department of Mathematics, UW Madison, during Fall of academic year 2020-2022
5. Qual-Analysis committee, Department of Mathematics, UW Madison, 2020-2022
6. Committee Continuing MA Advisors, UW, Madison, 2017-2021
7. VISP-MA Program Committee: Advised 5 VISP students, UW Madison, 2018-2021
8. Co-organizer Putnam Club: [Putnam Club](#), Fall 2017- present. Chair of the Putnam Club during 2018-2019; expanded Putnam program to Spring Semester.
9. Served as a referee for several mathematical journals (last's year list)
  - *Inventiones mathematicae*
  - *Annales de l'Institut Henri Poincaré, Analyse Non Linéaire*
  - *Mathematical Reviews/MathSciNet* Reviewer,
  - *Archive for Rational Mechanics*,
  - *Revista Matemática Iberoamericana*
  - *Nonlinearity*,
  - *Nonlinear Analysis Theory, Methods & Applications*
  - NSF panelist during 2017, 2018, 2019, 2021, 2022.

RECENT  
TEACHING

- Instructor for Math 629 - Introduction to Measure Theory, University of Wisconsin at Madison, Spring 2023
- Instructor for Math 821 - Topics in Partial Differential Equations, University of Wisconsin at Madison, Fall 2022
- Instructor for Math 221 - Calculus & Analytic Geometry, University of Wisconsin at Madison, Spring 2022
- Instructor for Math 821 - Topics in Partial Differential Equations, University of Wisconsin at Madison, Fall 2021
- Instructor for Math 719 (former Math 819) - Partial Differential Equations, University of Wisconsin at Madison, Fall 2021
- Instructor for Math 819 - Partial Differential Equations, University of Wisconsin at Madison, Fall 2020
- Instructor for Math 521 - Introduction to Analysis, University of Wisconsin at Madison, Fall 2020
- Instructor for Math 819 - Partial Differential Equations, University of Wisconsin at Madison, Fall 2019

- Instructor for Math 619 - Analysis of PDE, University of Wisconsin at Madison, Spring 2019
- Instructor for Math 222 - Calculus & Analytic Geometry 2, University of Wisconsin at Madison, 2 sections, Fall 2018
- Instructor for Math 431 - Introduction to Probability, University of Wisconsin at Madison two sections, Fall 2017