Efstathios G. Charalampidis

Contact Information

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Google scholar: https://scholar.google.com/citations?user=pGrs2YIAAAAJ&hl=en

Research Interests

Applied Mathematics, Numerical Analysis, Ordinary and Partial Differential Equations, Mathematical Physics, Gravitation, Solitary Waves

Academic Employment

- **University of Massachusetts Amherst**, Department of Mathematics and Statistics
  - ▷ Lecturer, September 2018 - present
  - ▷ Visiting Assistant Professor, September 2015 - August 2018
  - ▷ Postdoctoral Research Associate, November 2014 - June 2015
  - ▷ Postdoctoral Research Associate, November 2013 - November 2014

Education

- **Aristotle University of Thessaloniki**, Department of Mathematical, Physical and Computational Sciences, Faculty of Engineering, Mathematics Division, Thessaloniki, Greece
  - ▷ **Ph.D. in Applied Mathematics**, November 2009 - June 2013
    Thesis title: *"Skyrmions, Topology and Geometry"*
    Supervisor: Professor Theodora I. Ioannidou
- **Aristotle University of Thessaloniki**, Physics Department, Thessaloniki, Greece
  - ▷ **M.Sc. in Computational Physics**, September 2007 - October 2009
  - ▷ **B.Sc. in Physics**, September 2002 - September 2007
    - ⋆ Major: Theoretical Physics

In preparation

[23] ***Skyrme model in Einstein-Gauss-Bonnet-dilaton theory***
E.G. Charalampidis, B. Kleihaus and J. Kunz

[22] ***A Cantilever Beam-Magnet model: An experimental and theoretical study***
A. Foehr, E.G. Charalampidis, C. Chong, P.G. Kevrekidis and C. Daraio

[21] ***Computing stationary solutions of a two-component 2D nonlinear Schrödinger system with deflated continuation***
E.G. Charalampidis, N. Boullé, P.G. Kevrekidis and P.E. Farrell

Publications & Preprints

[20] ***Origami-based impact mitigation via rarefaction solitary wave creation***
H. Yasuda, Y. Miyazawa, E.G. Charalampidis, C. Chong, P.G. Kevrekidis and J. Yang
(submitted) arXiv:1805.05909

[19] ***Lattices with internal resonator defects***
S. Leadenham, X. He, D. Mei, E.G. Charalampidis, P.G. Kevrekidis, E. Kim, J. Yang and A. Vainchtein
(to appear) arXiv:1804.04733

[18] ***Phononic Rogue Waves***
E.G. Charalampidis, J. Lee, P.G. Kevrekidis and C. Chong
(to appear) arXiv:1801.06086

[17] ***Extreme events in near integrable lattices***
C. Hoffmann, E.G. Charalampidis, D.J. Frantzeskakis and P.G. Kevrekidis
(submitted) arXiv:1710.04899

[16] ***Computing stationary solutions of the two-dimensional Gross-Pitaevskii equation with deflated continuation***
E.G. Charalampidis, P.G. Kevrekidis and P.E. Farrell
Commun. Nonlinear Sci. Numer. Simulat, **54**, 482 (2018)

[15] ***Rogue waves in ultracold bosonic seas***
E.G. Charalampidis, J. Cuevas-Maraver, D.J. Frantzeskakis and P.G. Kevrekidis
Rom. Rep. Phys., **70**, 504 (2018)

[14] ***Discrete BPS Skyrmions***
M. Agaoglou, E.G. Charalampidis, T.A. Ioannidou and P. G. Kevrekidis
J. Math. Phys., **58**, 091501 (2017)

[13] ***Revisiting Diffusion: Self-similar Solutions and the $t^{-1/2}$ Decay in Initial and Initial-Boundary Value Problems***
P.G. Kevrekidis, M.O. Williams, D. Mantzavinos, E.G. Charalampidis, M. Choi and I.G. Kevrekidis
Quart. Appl. Math., **75**, 581 (2017)

[12] ***SO(2)-induced breathing patterns in multi-component Bose-Einstein condensates***
E.G. Charalampidis, W. Wang, P.G. Kevrekidis, D.J. Frantzeskakis and J. Cuevas-Maraver
Phys. Rev. A, **93**, 063623 (2016)

[11] ***Vortex-soliton complexes in coupled nonlinear Schrödinger equations with unequal dispersion coefficients***
E.G. Charalampidis, P.G. Kevrekidis, D.J. Frantzeskakis and B.A. Malomed
Phys. Rev. E, **94**, 022207 (2016)

[10] ***Nonlinear vibrational-state excitation and piezoelectric energy conversion in harmonically driven granular chains***
C. Chong, E. Kim, E.G. Charalampidis, H. Kim, F. Li, P.G. Kevrekidis, J. Lydon, C. Daraio and J. Yang
Phys. Rev. E, **93**, 052203 (2016)

[9] ***Formation of rarefaction waves in origami-based metamaterials***
H. Yasuda, C. Chong, E.G. Charalampidis, P.G. Kevrekidis and J. Yang
Phys. Rev. E, **93**, 043004 (2016)

[8] ***Wormholes from chiral fields***
E.G. Charalampidis, T.A. Ioannidou, B. Kleihaus and J. Kunz
J. Phys. Conf. Ser., **574**, 012058 (2015)

[7] ***Time-Periodic Solutions of Driven-Damped Trimer Granular Crystals***
E.G. Charalampidis, F. Li, C. Chong, J. Yang and P.G. Kevrekidis
Math. Prob. in Eng., **2015**, 830978 (2015)

[6] ***Lattice three-dimensional skyrmions revisited***
E.G. Charalampidis, T.A. Ioannidou and P.G. Kevrekidis
Phys. Scr., **90**, 025202 (2015)

[5] ***Dark-bright solitons in coupled nonlinear Schrödinger equations with unequal dispersion coefficients***
E.G. Charalampidis, P.G. Kevrekidis, D.J. Frantzeskakis and B.A. Malomed
Phys. Rev. E, **91**, 012924 (2015)

[4] ***Vector rogue waves and dark-bright boomeronic solitons in autonomous and non-autonomous settings***
R. Babu Mareeswaran, E.G. Charalampidis, T. Kanna, P.G. Kevrekidis and D.J. Frantzeskakis
Phys. Rev. E, **90**, 042912 (2014)

[3] ***Rogue waves in nonlinear Schrödinger models with variable coefficients: Application to Bose-Einstein condensates***
J.S. He, E.G. Charalampidis, P.G. Kevrekidis and D.J. Frantzeskakis
Phys. Lett. A, **378**, 577 (2014)

[2] ***Wormholes threaded by chiral fields***
E.G. Charalampidis, T.A. Ioannidou, B. Kleihaus and J. Kunz
Phys. Rev. D, **87**, 084069 (2013)

[1] ***Skyrmions, rational maps and scaling identities***
E.G. Charalampidis, T.A. Ioannidou and N.S. Manton
J. Math. Phys., **52**, 033509 (2011)

Fellowships & Grants

- US AFOSR (FA9550-12-1-0332) grant
  - ▷ Postdoctoral fellowship, November 2014 - June 2015
- European Commission, Community Research: "FP7, Marie Curie Actions, International Research Staff Exchange Scheme (IRSES-605096)" grant
  - ▷ Postdoctoral fellowship, November 2013 - November 2014
- DFG Research Training Group 1620 "Models of Gravity", Institüt für Physik, Universität Oldenburg, Germany
  - ▷ Research fellowship, August 4 - October 5, 2013
- Department of Mathematical, Physical and Computational Sciences, Faculty of Engineering, Mathematics Division, Aristotle University of Thessaloniki, Greece
  - ▷ Research studentship, September 2010 - June 2011
  - ▷ Research studentship, March 2010 - July 2010

Honors & Awards

- University of Massachusetts Amherst
  - ▷ Nominated for the "Distinguished Teaching Award", November 2017
- Research Committee, Aristotle University of Thessaloniki, Greece
  - ▷ "Scholarship of Excellence", 2012

Research Visits

- Division of Applied Mathematics, Brown University, Providence, RI, June 26 - June 29, 2018
- The Program in Applied & Computational Mathematics, Princeton University, NJ, January 16 - January 18, 2017
- The Program in Applied & Computational Mathematics, Princeton University, NJ, September 15 - September 21, 2016
- Department of Mathematics and Statistics, San Diego State University, CA, May, 2016
- The Iby and Aladar Fleischman Faculty of Engineering, Tel Aviv University, Israel, July, 2015
- Institüt für Physik, Universität Oldenburg, Germany, August - October, 2013
- Department of Mathematics and Statistics, University of Massachusetts Amherst, MA, September - October, 2012
- Institüt für Physik, Universität Oldenburg, Germany, July, 2012

Conferences & Talks

- "SIAM Conference on Nonlinear Waves and Coherent Structures", Orange, CA, June 11-14, 2018. Co-organizer (with V. Rothos) of the special session on "Localized Structures in Nonlinear Evolution and Lattice Equations". Talk title: "*Formation of rogue waves in continuum and discrete models: Theory and Computation*"
- Colloquium, Department of Mathematics, Bowdoin College, Brunswick, ME, May 3, 2018. Talk title: "*Nonlinear waves in atomic Bose-Einstein Condensates: Theory and Computation*"

- "Brown/Boston University Dynamics and PDEs Seminar", Brown University, Providence, RI, April 19. 2018. Talk title: "*Formation of rogue waves in continuum and discrete models: Theory and Computation*"

- "AMS Spring Central Sectional Meeting", Ohio State University, Columbus, OH, March 17-18, 2018. Talk title: "*Formation of rogue waves in continuum and discrete models: Theory and Computation*"

- Colloquium, William E. Boeing Department of Aeronautics & Astronautics, University of Washington, Seattle, WA, October 6, 2017. Talk title: "*Nonlinear waves in Granular Crystals*"

- "The IV AMMCS International Conference", Wilfrid Laurier University, Waterloo, ON, Canada, August 20-25, 2017. Talk title: "*Nonlinear waves in nonlinear Schrödinger (NLS) systems*"

- "The 10th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory", University of Georgia, Athens, GA, March 29-April 1, 2017. Co-organizer (with V. Rothos) of the special session on "Nonlinear Waves: Mathematical Methods and Applications". First talk title: "*Formation of rogue waves in nonlinear Schrödinger (NLS) systems: Theory and Computation*"; second talk title: "*Multi-component nonlinear waves in nonlinear Schrödinger (NLS) systems*"

- "AMS Spring Southeastern Sectional Meeting", College of Charleston, Charleston, SC, March 10-12, 2017. Talk title: "*Multi-component nonlinear Schrödinger (NLS) systems: From Theory to Numerical Computations*"

- Colloquium, Department of Mathematics, Miami University, Oxford, OH, January 25, 2017. Talk title: "*Nonlinear waves in NLS systems and beyond: Theory and Computation*"

- "AMS Fall Eastern Sectional Meeting", Bowdoin College, Brunswick, ME, September 24-25, 2016. Talk title: "*Multi-component nonlinear waves in one and two dimensional coupled nonlinear Schrödinger (NLS) systems: Theory and Numerical Computations*"

- "SIAM Conference on Nonlinear Waves and Coherent Structures", Philadelphia, PA, September 24-25, 2016. Co-organizer (with C. Chong) of the special session on "Analysis and Applications of the Nonlinear Schrödinger Equation". Talk title: "*Dark-bright solitons and their two-dimensional counterparts in coupled nonlinear Schrödinger (NLS) Systems*"

- "2016 Summer Undergraduate Research Conference", Department of Mathematics and Statistics, Williams College, Williamstown, MA, July 29, 2016. Accompanying REU students from UMass

- Colloquium, Department of Mathematics and Statistics, San Diego State University, San Diego, CA, May 16, 2016. Talk title: "*Dark-bright solitons and their two-dimensional counterparts in coupled nonlinear Schrödinger (NLS) Systems*"

- Colloquium, Department of Mathematics, Bowdoin College, Brunswick, ME, March 8, 2016. Talk title: "*Dark-bright solitons and their two-dimensional counterparts in coupled nonlinear Schrödinger (NLS) Systems*"

- Nonlinear Waves Seminar, Department of Mathematics and Statistics, University of Massachusetts Amherst, MA, February 12, 2016. Talk title: "*Skyrmions, Topology and Geometry*"

- "Emergent Paradigms in Nonlinear Complexity: From PT-Symmetry to Nonlinear Dirac Systems, From Polaritons to Skyrmions", Santa Fe Institute, Santa Fe, NM, June 8-10, 2015. Talk title: "*Skyrmions, Topology and Geometry*"

- "SIAM Conference on Applications of Dynamical Systems", Snowbird, UT, May 17-21, 2015. Talk title: "*Vector Rogue Waves and Dark-Bright Boomeronic Solitons in Autonomous and Non-Autonomous Settings*"

- "The 9th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory", University of Georgia, Athens, GA, April 1-4, 2015. Talk title:

"*Dark-bright solitons in coupled nonlinear Schrödinger (NLS) equations with unequal dispersion coefficients*"

- Colloquium, Institüt für Physik, Universität Oldenburg, Germany, September 27, 2013. Talk title: "*Topological properties of the Skyrme model*"
- Nonlinear Waves Seminar, Department of Mathematics and Statistics, University of Massachusetts Amherst, MA, September 28, 2012. Talk title: "*Skyrmions, rational maps and scaling identities*"
- "IMA's Conference on Nonlinearity and Coherent Structures", University of Reading, UK, July 6-8, 2011. Talk title: "*Skyrmions, rational maps and scaling identities*"
- "Conference on Computational Methods in Dynamics", The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy, July 4-8, 2011
- "Young Researchers in Mathematics 2011", Mathematics Institute, University of Warwick, UK, April 14-16, 2011. Talk title: "*Skyrmions, rational maps and scaling identities*"
- Department of Mathematical, Physical and Computational Sciences, Faculty of Engineering, Mathematics Division, Aristotle University of Thessaloniki, Greece, December 2010. 1st meeting of PhD candidates. Talk title: "*Skyrmions, rational maps and scaling identities*"
- "Geometry and Physics in Cracow", Institute of Mathematics, Jagiellonian University, Cracow, Poland, September, 2010. Poster presentation
- "10th Hellenic School and Workshops on Elementary Particle Physics and Gravity", Corfu, Greece, September, 2010
- "2010 Workshop on Recent Advances in Particle Physics", Aristotle University of Thessaloniki, Thessaloniki, Greece, March, 2010

Schools & Seminars

- Summer School for Graduate Students, Wolfersdorf, Germany
  - ▷ 17th Saalburg Summer School on "Foundations and New Methods in Theoretical Physics", August 29 - September 09, 2011
- The Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy
  - ▷ "School on Computational Methods in Dynamics", June 20 - July 1, 2011
- School of Mathematics, Statistics and Actuarial Sciences, University of Kent, UK
  - ▷ "Classical And Quantum Integrable Models", July, 2010

Teaching Experience

- University of Massachusetts Amherst
  - ▷ MATH 456 - Mathematical Modeling, Fall 2018
  - ▷ MATH 331 - Ordinary Differential Equations for Scientists and Engineers, Fall 2018
  - ▷ MATH 551 - Introduction to Scientific Computing, Spring 2018
  - ▷ MATH 552 - Applications of Scientific Computing, Spring 2018
  - ▷ MATH 331 - Ordinary Differential Equations for Scientists and Engineers, Fall 2017
  - ▷ MATH 551 - Introduction to Scientific Computing, Fall 2017
  - ▷ MATH 551 - Introduction to Scientific Computing, Spring 2017
  - ▷ MATH 233 - Multivariable Calculus, Fall 2016
  - ▷ MATH 331 - Ordinary Differential Equations for Scientists and Engineers, Spring 2016
  - ▷ MATH 331 - Ordinary Differential Equations for Scientists and Engineers, Fall 2015
- Aristotle University of Thessaloniki, Faculty of Engineering, Thessaloniki, Greece
  - ▷ Teaching Assistant for Linear Algebra and Partial Differential Equations, September 2010-June 2013

Mentoring Experience

- University of Massachusetts Amherst
  - ▷ **Postdocs**:
    - ⋆ September 2016 - September 2017: Christian Hoffmann
  - ▷ **REU students**:
    - ⋆ Summer 2016: Anya Conti
      Project title: "Modeling Rogue Waves in the Nonlinear Schrödinger Equation and Ablowitz-Ladik Lattice System"
    - ⋆ Summer 2017: Sydney Hauver and Xinyi He
      Project title: "Study of solitary wave propagation in woodpile chains"
    - ⋆ Summer 2018: Katherine Donoghue
      Project title: "The formation of rogue waves in granular crystals"
  - ▷ **Undergraduate Theses**:
    - ⋆ September 2018 - May 2019: Jennifer Sullivan
      Honors Thesis title: "On the stability of localized solutions in the Ablowitz-Ladik model"

Synergistic Activities

- University of Massachusetts Amherst
  - ▷ Chief Undergraduate Advisor (CUA) for the Department of Mathematics and Statistics, September 2018 - present
  - ▷ Organizer of the Nonlinear Waves Seminar, September 2015 - September 2017
- Co-organizer (with J. Bramburger and R. Goh) of the Brown/BU/UMass PDE Seminar, since 2018
- Member of the Scientific Program Committee of the "IMACS International conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory", University of Georgia, Athens, GA, since 2018
- Peer-reviewer for scientific journals:
  - ▷ *Physics Letters A*, since 2014
  - ▷ *Journal of Applied Physics (AIP)*, since 2017
  - ▷ *European Physical Journal B*, since 2017

Professional Memberships

- Society for Industrial and Applied Mathematics (SIAM), since 2014
- American Mathematical Society (AMS), since 2014

Computer Literacy Skills

- Computer proficient: Operating systems Linux, Unix, MacOS, Windows
- Programming Languages: Fortran, C/C++, Python, Bash scripting, Java
- Softwares: Mathematica, MATLAB, Maple, AUTO software for continuation and bifurcation problems, REDUCE algebra system, Root
- Parallel Programming: OpenMP

Other activities & Interests

- Knowledge of jazz and classical harmony
- Degree in jazz guitar, June 2008
- Music teacher: taught the electric and acoustic guitar at the Conservatory of Municipality of Ampelokipoi, Thessaloniki, Greece, October 2007 - January 2008
- Electronics: Design and construction of hi-fi tube amplifiers
- Sports: Participated in weightlifting competitions (Gold medal in the Northern Greece Championship), 1997 - 2000
- Philosophy of the sciences, history of music and physics; literature

Foreign Languages

- French: basic

Professional References

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