

# CURRICULUM VITAE

## IGNAT, Ioan Liviu

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### 1. Education

Habilitation Thesis, IMAR, May 31, 2013

Ph.D., Universidad Autónoma de Madrid, September 15, 2006

Bachelor's degree, Universitatea din Craiova, Romania, July, 2001

Student of University of Pittsburgh, USA, 09/1998-05/1999.

### 2. Professional Experience

Researcher CS-III, Institute of Mathematics of the Romanian Academy, 01/05/2008 –

Researcher, Institute of Mathematics of the Romanian Academy, 01/07/2006-31/04/2008

Assistant Professor, Universidad Autónoma de Madrid, 01/04/2006-31/09/2007

### 3. Publications

#### Submitted

- (1) Liviu I. Ignat, A. Pozo, E. Zuazua. Large time asymptotics, vanishing viscosity and numerics for 1-D scalar conservation laws, submitted.
- (2) Liviu I. Ignat, Ademir Pazoto. Large time behaviour for a nonlocal diffusion - convection equation related with the gas dynamics, submitted.
- (3) Liviu I. Ignat, Tatiana I. Ignat, Denisa Stancu-Dumitru. A compactness tool for the analysis of nonlocal evolution equations, submitted.
- (4) V. Banica, L. I. Ignat. Dispersion for the Schrödinger equation on the line with multiple Dirac delta potentials and on delta trees, submitted.
- (5) N. Beli, L. Ignat, E. Zuazua. Dispersion for 1-d Schrödinger and wave equation with BV coefficients, submitted.

#### Accepted/Published

- (6) Liviu I. Ignat, Damian Pinasco, Julio D. Rossi, and Angel San Antolin. Decay estimates for nonlinear nonlocal diffusion problems in the whole space. Accepted *Journal d'Analyse Mathématique*
- (7) Liviu I. Ignat and Enrique Zuazua. Asymptotic expansions for anisotropic heat kernels. *J. Evol. Equ.* 13 (2013), no. 1, 1-20.
- (8) Liviu I. Ignat and Enrique Zuazua. Convergence rates for dispersive approximation schemes to nonlinear Schrödinger equations. *J. Math. Pures Appl.*, (9) 98 (2012), no. 5, 479–517.
- (9) Liviu I. Ignat, Julio D. Rossi, and Angel San Antolin. Lower and upper bounds for the first eigenvalue of nonlocal diffusion problems in the whole space. *Journal of Differential Equations*, 252(12):6429 – 6447, 2012.
- (10) Liviu I. Ignat, Ademir Pazoto and Lionel Rosier. Inverse problem for the heat equation and the Schrödinger equation on a tree. *Inverse Problems*, 28(015011), 2012.
- (11) Valeria Banica and Liviu I. Ignat. Dispersion for the Schrödinger equation on networks. *J. Math. Phys.*, 52(083703), 2011.

- (12) Liviu I. Ignat and Diana Stan. Dispersive properties for discrete Schrödinger equations. *Journal of Fourier Analysis and Applications*, 17(5):1035–1065, 2011.
- (13) Liviu I. Ignat, A splitting method for the nonlinear Schrödinger equation, *Journal of Differential Equations Vol. 250, Issue 7, 1 April 2011, pp, 3022–3046*
- (14) L.I. Ignat, Strichartz estimates for the Schrödinger Equation on a tree and applications, *SIAM Journal of Mathematical Analysis*, Vol. 42, No. 5, pp. 2041–2057, 2010.
- (15) L.I. Ignat and J.D. Rossi, Asymptotic expansions for nonlocal diffusion equations in  $L^q$ -norms for  $1 \leq q \leq 2$ . *Journal of Mathematical Analysis and Applications* 362 (2010), pp. 190–199.
- (16) L.I. Ignat and J.D. Rossi, Decay estimates for nonlocal problems via energy methods. *Journal de Mathématiques Pures et Appliquées*, (9) 92 (2009), no. 2, 163–187.
- (17) L.I. Ignat and E. Zuazua. Convergence of a two-grid algorithm for the control of the wave equation. *Journal of European Mathematical Society*, 11 (2009), no. 2, 351–391.
- (18) L.I. Ignat and E. Zuazua. Numerical dispersive schemes for the nonlinear Schrödinger equation. *SIAM Journal of Numerical Analysis*, 47 (2009), no. 2, 1366–1390..
- (19) L.I. Ignat and J.D. Rossi, Refined asymptotic expansions for nonlocal diffusion equations *Journal of Evolution Equations*, 8 (2008), no. 4, 614–629.
- (20) L.I. Ignat and J.D. Rossi, Asymptotic behaviour for a nonlocal diffusion equation on a lattice. *Z. Angew. Math. Phys.* 59 (2008), no. 5, 918–925.
- (21) L. I. Ignat and J.D. Rossi. *A nonlocal convection-diffusion equation*. *J. Functional Analysis*, 251(2) (2007), 399–437.
- (22) L.I. Ignat. Fully discrete schemes for the Schrödinger equation: Dispersive properties. *Math. Models Methods Appl. Sci.*, 17(4):567–591, 2007.
- (23) L.I. Ignat. Global Strichartz estimates for approximations of the Schrödinger equation. *Asymptotic Analysis*, 52:37–51, 2007.
- (24) L.I. Ignat and E. Zuazua. Dispersive properties of numerical schemes for nonlinear Schrödinger equations. In *Foundations of Computational Mathematics, Santander 2005*. *L. M. Pardo et al. eds*, volume 331, pages 181–207. London Mathematical Society Lecture Notes, 2006.
- (25) L.I. Ignat. Qualitative properties of a numerical scheme for the heat equation. Bermúdez de Castro, A. (ed.) et al., *Proceedings of ENUMATH 2005, the 6th European conference on numerical mathematics and advanced applications*, Santiago de Compostela, Spain, July 18–22, 2005. Springer. 593-600, 2006.
- (26) L.I. Ignat and E. Zuazua. A two-grid approximation scheme for nonlinear Schrödinger equations: dispersive properties and convergence. *C. R. Acad. Sci. Paris, Ser. I*, 341(6):381–386, 2005.
- (27) L.I. Ignat and E. Zuazua. Dispersive properties of a viscous numerical scheme for the Schrödinger equation. *C. R. Acad. Sci. Paris, Ser. I*, 340(7):529–534, 2005.
- (28) L. I. Ignat and C. Lefter and V. D. Radulescu, Minimization of the renormalized energy in the unit ball of  $R^2$ . *Nieuw Arch. Wiskd.* (5) 1 (2000), no. 3, 278–280

#### 4. Awards

- (1) "Dimitrie Pompeiu" prize of the Romanian Academy, 2009.
- (2) 2009 ANCS (National Authority for Scientific Research) prize for the best young researcher returned to Romania.
- (3) Honorable Mention, Putnam Competition, USA, 1998.
- (4) Silver Medal, International Mathematical Olympiad, Argentina, 1997.

#### 5. Students

- (1) Diana Stan (actually PhD student at ICMAT, CSIC, Madrid), Scoala Normala Superioara Bucuresti, Master Thesis, 2010.
- (2) Cristian Gavrus, (actually PhD student Univ. of California Berkeley), Scoala Normala Superioara Bucuresti, Master Thesis, 2012.

- (3) Denisa Stancu Dumitru, postdoctoral student, IMAR.
- (4) Cristian Cazacu, postdoctoral student, IMAR.

## 6. Teaching

- (1) Numerical Methods for Partial Differential Equations, SNSB, 2010-2011
- (2) Numerical schemes for dispersive equations, February 08, 2010 - February 12, 2010, BCAM, Bilbao, Spain
- (3) Evolution equations, SNSB, 2009-2010.
- (4) Evolution equations: dissipation and dispersion, SNSB, 2008-2009

## 7. Organizer/Coorganizer of scientific events

- (1) Special Session: Calculus of Variations and Partial Differential Equations, Joint International Meeting of the AMS and the Romanian Mathematical Society, Organizers: Marian Bocea (Loyola University, Chicago, mbocea@luc.edu), Liviu Ignat (Institute of Mathematics of the Romanian Academy), Mihai Mihailescu (University of Craiova & IMAR), Daniel Onofrei (University of Houston), June 27 - 30, 2013, Alba Iulia, Romania
- (2) Workshop for Young Researchers in Mathematics, Constanța, May 09 - May 10, 2013,
- (3) Workshop for Young Researchers in Mathematics, Constanța, May 10 - May 11, 2012,
- (4) Workshop for Young Researchers in Mathematics, Constanța, May 12 - May 13, 2011,
- (5) WORKSHOP ON PARTIAL DIFFERENTIAL EQUATIONS Bucharest, November 25-26, 2010
- (6) WORKSHOP ON PARTIAL DIFFERENTIAL EQUATIONS Bucharest, October 29 - 30, 2008

## 8. Research Projects

### Director of Research Projects

- (1) Analysis, Control and Numerical Approximations of Partial Differential Equations, CNCS, PN II, PN-II-ID-PCE-2011-3-0075, 01/10/2011-30/09/2014, 1500000RON
- (2) Cualitative properties of partial differential equations and their numerical approximations, CNCSIS, PN II, TE-4/2010, 28/07/2010 - 27/07/2013, 750000RON
- (3) Cualitative properties of difussion and dispersion in the study of the nonlinear problems and their numerical approximations, CNCSIS, PN II, RP-3,10/2007-09/2009, 500000 RON.

### Member in Research Projects

- (1) New analytical and numerical methods in wave propagation, NUMERIWAVES, FP7 - 246775, financed by European Research Council ERC, IP E. Zuazua
- (2) Partial Differential Equations: Analysis, Control, Numerics and Applications, MTM2011-29306, financed by the MICINN SPAIN, 2012-2014, IP E. Zuazua
- (3) Ecuaciones en Derivadas Parciales: Análisis, Control, Numérico y Aplicaciones, MTM2008-03541, MEC Spain, 2009-2011, 182300 euros, Grant Director Enrique Zuazua.
- (4) Dezvoltarea unui parteneriat european pentru studiul unor probleme actuale de analiza matematica, IMAR, CEx06-M3-102/01.08.2006, August 2006 - Iulie 2008, Grant Director: Prof. Dr. Florin Rădulescu.
- (5) Desarrollo de aplicacion informatica para el diseno optimo aeronautico mediante tecnicas novedosas, Universidad Autonoma de Madrid, PLAN NACIONAL DE INVESTIGACION CIENTIFICA, DESARROLLO E INNOVACION TECNOLOGICA (CIT-370200-2005-10) MEC- Spain, 1/11/2005 - 30/10/2008, Grant Directors: Francisco Palacios, Instituto Nacional de Tecnica Aeroespacial, Enrique Zuazua Iriondo UAM, 240000 euro.
- (6) Analisis, aproximacion numerica y diseno optimo de ecuaciones en derivadas parciales, MTM 2005-00714, Universidad Autonoma de Madrid, MEC, 01/11/2005 - 31/10/2008, Grant Director Enrique Zuazua Iriondo, 192 000 euro.

- (7) Analisis, Control y Simulacion Numerica en medios heterogeneos y en la interaccion fluido-estructura, BFM2002-03345, Universidad Autónoma de Madrid, MCYT, Grant Director Enrique Zuazua Iriondo, 171 000 euro.
- (8) Smart system, new materials, adaptive systems and their nonlinearities modelling, control and numerical simulation, HPRN-CT-2002-00284, Universidad Autónoma de Madrid, EU, Grant Director: Enrique Zuazua Iriondo, 130000 euro Spanish group.
- (9) Homogenization and Multiple Scales, HPRN-CT-2000-00109, Universidad Autónoma de Madrid, EU, Grant Director Enrique Zuazua Iriondo, 180 000 euros Spanish group.

#### 9. Fellowships

- (1) Fellowship from Institute Henry Poincare Paris to participate to the program "Trimestre sur le Contrôle des Equations aux Drives Partielles et Applications ", Paris, oct-dec 2010.
- (2) Fellowship from Cambridge Philosophical Society as young participant to the program Highly Oscillatory Problems: Computation, Theory and Application of Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, 2007.
- (3) FPU fellowship for realizing the Ph.D. thesis, Spanish Ministry of Education, 01/01/2004-31/03/2006, Universidad Autónoma de Madrid, Madrid, Spain.
- (4) Pre-doctoral Fellowship, E.U Project Homogenization and Multiple Scales, 25/09/2002–31/12/2003, Universidad Autónoma de Madrid, Spain.
- (5) Scholarship from University Honours College of University of Pittsburgh, USA, 09/1998-05/1999, University of Pittsburg, USA.

#### 10. Presentations

- (1) "Nonlocal evolution equations", MTM Workshop, Basque Center for Applied Mathematics, 18th February, Bilbao, 2013
- (2) "Dispersion for Schrödinger equations", Pde's, Dispersion, Scattering theory and Control theory, Monastir, 10-14 June 2013
- (3) "Long-time behaviour for a nonlocal convection-diffusion equation", AMS Meeting, Alba Iulia, June 27 - 30, 2013
- (4) Dispersive properties for Schrödinger equations" la Universitatea din Craiova, 6/09/2012
- (5) Dispersion for Schrödinger equations, XIIme Colloque Franco-Roumain de Mathmatiques Appliques, 24-30/08/2012, Bucharest
- (6) Nonlocal evolution problems, XIIme Colloque Franco-Roumain de Mathmatiques Appliques, 24-30/08/2012, Bucharest
- (7) Dispersive properties for Schrödinger equations, Univ. Evry, France, 21 jun 2012.
- (8) Dispersive properties for Schrödinger equations, Partial differential equations, optimal design and numerics, Benasque, September 05, 2011
- (9) Open session on networks, Partial differential equations, optimal design and numerics, Benasque, Spain, September 06, 2011
- (10) Dispersive properties for Schrödinger equations, The Seventh Congress of Romanian Mathematicians, Brasov, June 29, 2011
- (11) Dispersive properties for Schrödinger equations, Workshop for Young Researchers in Mathematics, Constanta, May 12, 2011
- (12) Dispersive properties for Schrödinger equations, Seminário de Anlise/EDP, Instituto de Matematica, Universidade Federal do Rio de Janeiro, April 14, 2011
- (13) Dispersive properties for Schrödinger equations, Seminário de Equações Diferenciais Parciais, IMPA, Rio de Janeiro, April 7, 2011
- (14) Liviu Ignat, Uniform Boundary Observability of a Two-Grid Method for the 2d- Wave Equation, Workshop on Control of Dispersive Equations November 8-10, 2010, part of Control of Partial and Differential Equations and Applications Trimester, Institute Henri Poincare, Paris

- (15) Liviu Ignat, Null controllability of the heat equation on the Heisenberg group, Workshop Control of parabolic equations and systems, applications to fluids, November 15-19, 2010, part of Control of Partial and Differential Equations and Applications Trimester, Institute Henri Poincare, Paris
- (16) Liviu Ignat, Strichartz estimates for the Schroedinger equation on a tree and applications, Highly Oscillatory Problems: From Theory to Applications, 12-17 September 2010 , The Isaac Newton Institute, Cambridge, UK, Conferinta organizata de European Science Foundation
- (17) Convergence rates for dispersive approximation schemes to nonlinear Schrödinger equations, 10eme Colloque Franco-Roumain de Mathematiques Appliquees, Poitiers, august 2010, Franta, plenary talk
- (18) A splitting method for nonlinear Schrödinger equation, 10eme Colloque Franco-Roumain de Mathematiques Appliquees, Poitiers, august 2010, France
- (19) Asymptotics for nonlocal evolution equations, Workshop on Partial differential equations, optimal design and numerics, 28 august 2009, Benasque, Huesca, Spain
- (20) Schrodinger equations on trees, MTM Workshop, Basque Center for Applied Mathematics, 1 iulie 2009, Bilbao, Spania
- (21) Splitting methods for Schrodinger equations, MTM Workshop, Basque Center for Applied Mathematics, 1 iulie 2009, Bilbao, Spania
- (22) Asymptotics for nonlocal evolution equations, Workshop on non-local equations, Leganes, Madrid, 29-30 iunie 2009.
- (23) A nonlocal convection-diffusion equation, Romanian - German Symposium on Mathematics and its Applications May 14 - 17, 2009, Sibiu (Romania)
- (24) Asymptotics for nonlocal evolution equations, Basque Center for Applied Mathematics, Bilbao, Spania, dec. 2008.
- (25) Asymptotics for nonlocal evolution equations, Universit de Picardie-Jules Verne, Laboratoire Aminois de Mathématique Fondamentale et Applique, Amiens, Franța, sep. 2008.
- (26) A nonlocal convection diffusion equation, Exploratory Workshop on Asymptotic Analysis and Applications in Continuum Mechanics, Braşov, August 28 - 30, 2008.
- (27) A nonlocal convection-diffusion equation, Universidad Complutense de Madrid, 4/03/2008.
- (28) A nonlocal convection-diffusion equation, Dispersive CIM Workshop on PDE's, Numerical Simulation and Applications" organizat la Centro Internacional de Matematicas, Coimbra, 14/12/2007
- (29) A nonlocal convection-diffusion equation, IMAR, Bucuresti, 13/11/2007.
- (30) Uniform Boundary Observability of a Two-Grid Method for the 2d-Wave Equation, Workshop "Dispersive long waves models: control theory and boundary value problems", Wolfgang Pauli Institute, Viena, 17/10/ 2007
- (31) Dispersive schemes for linear and nonlinear Schrödinger equations, invited conference in the program Highly Oscillatory Problems: Computation, Theory and Application, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, 08/04/2007
- (32) Uniform Boundary Observability of a Two-Grid Method for the 2d-Wave Equation, Invited Conference, University Roma1 La Sapienza", Roma, 21/02/2007.
- (33) Uniform Boundary Observability of a Two-Grid Method for the 2d-Wave Equation, European Conference on Smart Systems, Roma, 26-28/10/2006.
- (34) Uniform Boundary Observability of a Two-Grid Method for the 2d-Wave Equation, International Congress of Mathematicians, Madrid, 22-30/08/2006.
- (35) Uniform Boundary Observability of a Two-Grid Method for the 2d-Wave Equation, Institute of Mathematics of Romanian Academy, Bucharest, 7-14/06/2006.
- (36) Numerical approximation scheme for dispersive equations, Workshop "Partial Differential Equations, Optimal Design and Numerics", Benasque, 28.08-09.09.2005.
- (37) Unique continuation property for the eigenvalues of the discrete Laplacian on the square, Workshop "Partial Differential Equations, Optimal Design and Numerics", Benasque, 28/08-09/09/2005.

- (38) Qualitative properties of Numerical Approximations of the Heat Equation, European Conference on Numerical Mathematics and Advanced Applications: Enumath 2005, Santiago de Compostela, 18-22/06/2005.
- (39) Schrödinger equations, numerical approximation schemes and dispersive properties, The seminar of Applied Mathematics of Department of Mathematics of Universidad Autónoma de Madrid, Madrid, Spain.
- (40) Dispersive properties for numerical approximation of Schrödinger Equation, Université de Tunis, Tunis, 30.04.2004.
- (41) Dispersive properties for numerical approximation of Schrödinger Equation, Midterm meeting of the TMR project Homogenization and multiple scales, Heidelberg, Germany, 6/12/2002 7/12/2002.
- (42) A Variational Approach to Discontinuous Problems with Critical Exponents, Inequalities, Timisoara, Rumania, 9/07/2001-14/07/2001.

11. Participant to programs, workshops, courses

- (1) Flow control in the presence of shocks: theory, numerics and applications Enrique Zuazua (BCAM) 23-27 November 2009, Basque Center for Applied Mathematics, Bilbao, Spain.
- (2) Control problems in quantum mechanics Jean-Pierre Puel (Université de Versailles St Quentin, France) 16-20 November 2009, Basque Center for Applied Mathematics, Bilbao, Spain.
- (3) Controle et problemes inverses pour les EDP : aspects theoriques et numeriques, CIRM, Marseille, France, 16-20/02/2009.
- (4) The program Highly Oscillatory Problems: Computation, Theory and Application organized by Isaac Newton Institute for Mathematical Sciences, Cambridge, Uk, 12/04/2007-09/05/2007.
- (5) The course "Computational Methods for Flow and Structural Control", Prof. Roland Glowinski, Univ. of Houston, 16-20/05/2005, Universidad Autónoma de Madrid, Madrid, Spain.
- (6) The course "A short course on Level Set Methods", Prof. Gregoire Allaire, Ecole Polytechnique Paris, 11-15/04/2005, Universidad Autónoma de Madrid, Madrid, Spain.
- (7) Primer Congreso Conjunto de Matemáticas RSME-SCM-SEIO-SEMA, Valencia, 31/01 04/02/2005, RSME-SCM-SEIO-SEMA, Valencia, Spain.
- (8) Fabes Lectures on Real Analysis & PDE's, Bilbao, 9/9/2004-11/09/2004, Universidad del País Vasco/Euskal Herriko Unibertsitatea, Spain.
- (9) 7th International Conference on Harmonic Analysis and Partial Differential Equations, El Escorial, Madrid, Spain, 21/06/2004-25/06/2004.
- (10) The course Domain Decomposition Solution of PDE's and Applications, Prof. Alfio Quarteroni, Ecole Polytechnique Fédérale de Lausanne, 23-27/02/2004, Universidad Autónoma de Madrid, Madrid, Spain
- (11) The course Nuevos Retos en Matemática Aplicada, Castro Urdiales, Spain, 1/09/2003-5/09/2003.
- (12) Workshop on Harmonic Analysis and Partial Differential Equations, Puerto Vallarta, Mexico, 23/06/2003-27/06/2003.
- (13) The course Numerical Analysis, Craiova, Romania, may 2002.
- (14) The course Nonlinear Analysis, Brasov, Romania, July 2000.