Rafael Díaz Fuentes

Curriculum Vitae

Education

2017–present **Ph.D. Computer Science and Computational Mathematics**, *University of Insubria*, Como, Italy, Advisor: Stefano Serra-Capizzano.
3rd year student (thesis submitted)

2012–2015 **M.Sc. Mathematics (summa cum laude)**, *University of Havana*, Havana, Cuba, Supervisors: Lucia Romani (University of Milano-Bicocca, Italy), Jorge Estrada-Sarlabous (ICIMAF, Cuba).
Thesis: *Perturbation of Dubuc-Deslauriers schemes for any arity*

2006–2010 **B.Sc. Mathematics (summa cum laude)**, *University of Havana*, Havana, Cuba, Supervisor: Jorge Estrada-Sarlabous (ICIMAF, Cuba).
Thesis: *Interpolatory subdivision scheme with local tension parameters based on conic spline*

Courses and Summer Schools

2018–2019 **Ph.D. Courses**, *University of Insubria*, Como, Italy.
Generalized Locally Toeplitz Sequences: A Spectral Analysis Tool for Discretized Differential Equations (Carlo Garoni). *Optimization techniques for imaging* (Peter Ochs). *Solar astronomical imaging* (Michele Piana). *Inverse Problems in Adaptive Optics* (Ronny Ramlau). *Deconvolution of interferometric images* (Marco Prato). *Reconstruction Methods for Sparse-data Tomography* (Samuli Siltanen). *Restoration of Medical Imaging* (Anna Maria Massone and Stephan G. Nekolla). *Regularization by filtering and variational methods: theoretical and numerical aspects* (Alessandro Buccini).

2018, May 21st-25th **Summer School**, *Computational Methods for Inverse Problems in Imaging*, Como, Italy, PhD Courses.
(Lecturers: Raymond Chan, Jim Nagy, Jean-Christophe Pesquet and Lothar Reichel)

2014, January–February **Summer School**, *IMPA (National Institute of Pure and Applied Mathematics)*, Rio de Janeiro, Brasil.
Course: Linear Algebra (mark A+). Seminar: Computer Graphics.

2013, January–February **M.Sc. Courses**, *University of Havana*, Havana, Cuba, Construction and analysis of surface subdivision schemes (Lucia Romani).
(mark 5/5)

2012, February-March **M.Sc. Courses**, *University of Havana*, Havana, Cuba, Subdivision curves (Lucia Romani).
(mark 5/5)

Experience

Scientific Research

September 2012–present **Junior Researcher**, *Institute of Cybernetics, Mathematics and Physics*, Havana, Cuba.
Subjects: Scattered Data Interpolation and Approximation. Subdivision schemes for curves and surfaces. Theory and efficient algorithms for solutions of problems from Operators Algebra and Geometric Modelling

September 2010–August 2012 **Cryptographic Researcher**, *Department of Cryptography (part of the Ministry of the Interior)*, Havana, Cuba.
Subjects: Random generation of matrices with nice cryptographic properties. Strength evaluation of S-box in Block Ciphers

Teaching

2020 March–July, October 2019–January 2020, 2019 March–July **Teaching Assistant**, *Deparment of Sciences and High Technology*, University of Insubria, Como, Italy.
Subject: Linear Algebra and Geometry.

September 2013–January 2014 **Lecturer**, *Biology Faculty*, University of Havana, Havana, Cuba.
Subject: Differential Calculus in one and more variables.

February 2013–July 2013 **Lecturer**, *Industrial Engineering Faculty*, Havana University of Technologies José Antonio Echeverría, Havana, Cuba.
Subject: Numerical Mathematics (Mathematics IV)

September 2012–January 2013 **Lecturer**, *Industrial Engineering Faculty*, Havana University of Technologies José Antonio Echeverría, Havana, Cuba.
Subject: Differential equations and Series (Mathematics III)

September 2008–June 2010 **Student Assistant**, *Mathematics and Computer Sciences Faculty. Biology Faculty*, University of Havana, Havana, Cuba.
Subjects: Mathematical Analysis I & II. Differential Calculus in one and more variables.

Thesis Directions and Examining Committee Experience

September–November 2019 **Co-supervisor**, *Student: Gabriele Ponisio. B.Sc. in Mathematics*, University of Insubria, Como, Italy.
Thesis: Schemi di suddivisione per la modellazione geometrica. (Thesis: Subdivision schemes for Geometric Design.)

February–June 2016 **Co-supervisor**, *Student: Javier Pino Torres. B.Sc. in Computer Sciences*, University of Havana, Havana, Cuba.
Thesis: Contornos activos basados en curvas B-spline: una aplicación a la segmentación de imágenes. (Active contours based on B-spline curves: an application to image segmentation.)

2012–2016 **Member of the Examining Committee for B.Sc./M.Sc. in Mathematics**, *Mathematics and Computer Sciences Faculty*, University of Havana, Havana, Cuba.

Software development

2017 **RailWave**, *Technical Lead*, ICIMAF, Cuba, Software to study the ultrasonic wave propagation problem in rails by analyzing dispersion curves with the semi-analytical method (SAFEM).
Language: C++. Platform: `Qt`. Library: `ARPACK`.

2016–2017 **SubdivisionSnake**, *Technical Lead*, ICIMAF, Cuba, Software for image segmentation with subdivision curves.
Languages: C#, Matlab. Platform: `.NET`. Libraries: `Optimization.dll`, `Accord.NET`.

Research Interests

- Geometric Modelling and Geometric Processing
- Subdivision of curves and surfaces
- Scattered Data Interpolation and Approximation
- Discrete Differential Geometry
- Inverse Problem
- Parameter estimation for regularization methods

Research Projects

2020 **Project INdAM-GNCS 2020**, *Research Project: Interpolazione e smoothing: aspetti teorici, computazionali e applicativi*, Project Leader: Lucia Romani, Role: Participant.
Italy.

2019 **Project INdAM-GNCS 2019**, *Research Project: Kernel-based approximation, multiresolution and subdivision methods and related applications*, Project Leader: Francesco Dell'Accio, Role: Participant.
Italy.

2013–2017 **Project 204.11010 PNCB (*Proyecto Nacional de Ciencias Básicas*) CITMA-Cuba**, *Research Project: Statistical, geometric and differential models for the solution of biomedical and technological problems*, Project Leader: PhD. Jesús Sánchez García, Role: Participant.
Cuba.

Computer skills

Intermediate C++, Qt Creator, Maxima, Linux

Advanced MATLAB, TEX/LATEX, Maple, Mathematica, Microsoft Windows

Languages

Spanish Native Speaker

English	Advanced	
Italian	Intermediate	
German	Basic	
Japanese	Basic	
Portuguese	Intermediate	*(only Listening and Reading)*

Publications (Technical Reports and Proceedings)

2020 R. Díaz-Fuentes, J. Pino-Torres, V. Hernández-Mederos and J. Estrada-Sarlabous. *Stationary subdivision snakes for contour detection*. REVISTA INVESTIGACION OPERACIONAL. 2020.

2018 J.A. Díaz-Lozada, R. Díaz Fuentes. *Problem-Solving Methods and Mathematical Thought Development*. Bolema: Boletim de Educação Matemática, vol.32 no.60, 57-74, 2018.

2016 R. Díaz-Fuentes. *Surface subdivision schemes based on local interpolation of triangular meshes (in Spanish)*. Technical Report ICIMAF. No. 830, ISSN 0138-8916. November 2016.

2015 R. Díaz-Fuentes, L. Romani, J. Estrada-Sarlabous. *From curve to surface subdivision by using Lagrange fundamental polynomials*. Technical Report ICIMAF. No. 795, ISSN 0138-8916. November 2015.

2014 R. Díaz-Fuentes, L. Romani, L. A. Borrego-Núñez. *New family of m-ary interpolatory subdivision schemes with one parameter*. Technical Report ICIMAF. No. 762, ISSN 0138-8916, November 2014.

2014 P. Freyre, N. Díaz, R. Díaz, C. Pérez. *Random generation of MDS matrices*. In Proceedings: 3rd Workshop on Current Trends in Cryptology. CTCRYPT 2014, Moscow, Russia. June, 2014.

2013 R. Díaz-Fuentes, J. Estrada-Sarlabous. *Curvature assignment algorithm for planar data (in Spanish)*. Technical Report ICIMAF. No. 721, ISSN 0138-8916, November 2013.

2012 J. A. Díaz-Lozada, R. Díaz-Fuentes. *Heuristic instruction and estimulation of mathematical thought development by problem solving (in Spanish)*. Revista IPLAC, Publicación Latinoamericana y Caribeña de Educación. No. 6, ISSN 1993-6850. 2012.

2010 J. Estrada-Sarlabous, R. Díaz-Fuentes. *Interpolatory subdivision scheme with local tension parameters based on conic spline (in Spanish)*. Technical Report ICIMAF. No. 582, ISSN 0138-8916. November 2010.

Participation at Congresses, workshops, meetings

January 2020	Multivariate Approximation: Theory and Applications (MATA2020). Perugia, Italy.
February 2019	Due Giorni di Algebra Lineale Numerica. Rome, Italy.
June 2016	XII International Conference Approximation and Optimization in the Caribbean. Cuba.
January 2013, 2014, 2015, 2016, 2017	Encuentro Cuba-México de Métodos Numéricos y Optimización (Cuba-Mexico Workshop on Numerical Methods and Optimization), EMNO. Cuba.
November 2011, 2013, 2015	International Conference of Mathematics and Computer Science (COMPUMAT). Cuba.
2010, 2012	International Conference on Operations Research. Cuba.
April 2010, 2012, 2013, 2014, 2015, 2016	Scientific Conferences of ICIMAF (Institute of Cybernetic, Mathematics and Physic). Cuba.
2009	Latin American and Caribbean School of Mathematics. Cuba.

Awards

Researcher Activity

2015 **National Award** of the *Cuban Science Academy*, for his contributions as coauthor in the work entitled "Subdivision schemes for curves generation", La Habana, Cuba, 2015.

Como, 27/12/2020

Date