Francisco Blanco-Silva

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Education

Ph.D. in Mathematics August 2007
Purdue University, West Lafayette, Indiana, USA.
Dissertation topic: The Curvelet Transform. A Generalized Definition and Approximation Properties.

M.Sc. in Mathematics May 2002
Purdue University, West Lafayette, Indiana, USA.
Applied Mathematics Program.

B.Sc. in Mathematical Sciences September 1997
Universidad Complutense de Madrid, Madrid, Spain.
Major in Pure Mathematics: Geometry and Topology.

Research Interests

Approximations and Expansions (Approximation Theory), Harmonic Analysis, Mathematical Imaging, Numerical Analysis, Scientific Computing.

Work Experience

Research Assistant Professor 08/2007 – 05/2010
Part-time Instructor 08/2011 – 05/2012
Department of Mathematics. University of South Carolina.
1523 Greene Street. Columbia, SC 29208
Hours worked per week: 40 hours
Supervistor: Jerrold Griggs. **Phone**: +1 (803) 777-4225
Job description: Instructor for the Department of Mathematics.

Teaching under-graduate courses in Mathematics at all levels.

Supervisor: Robert Sharpley. **Phone**: +1 (803) 777-6268
Job description: Post-doctoral position with the Industrial Mathematics Institute.

1. Research on the development of multiresolution formulated algorithms to enable high compression rates using non-linear approximation methods, enhanced procedures for Hausdorff metric estimation, and the efficient structures for organization of digital urban terrain data.
2. Research on systematic approaches to extracting high resolution information from HAADF–STEM images which will be beneficial to the characterization of beam sensitive materials. The idea is to treat *several, possibly many* low electron dose images with specially adapted digital image processing concepts at a minimum allowable spatial resolution. The goal is to keep the overall cumulative electron dose as low as possible while still staying close to an acceptable level of physical resolution.

Teaching Assistant 08/01/2005–04/30/2006
School of Mathematics, University of Minnesota.
127 Vincent Hall, 206 Church St. S.E., Minneapolis, MN 55455
Hours worked per week: 20 hours
Supervisor: Larry Gray. **Phone**: +1 (612) 625-5591
Job description: Recitation Instructor and Grader: Partial Differential Equations, Abstract Algebra (both Graduate Courses).

Teaching Assistant 08/01/1999–06/31/2007
Department of Mathematics, Purdue University.
150 N. University Street, West Lafayette, IN 47907
Hours worked per week: 20 hours
Supervisor: Rita Saerens. **Phone**: +1 (765) 494-1914
Job description: Lecturer, Recitation Instructor and Grader for several undergraduate courses in Algebra, Trigonometry, Calculus, Geometry and Differential Equations.

Services

Owner Tizona Scientific Solutions LLC 07/2011 – present
Scientific Consulting Company: Tizona delivers solutions to commercial clients through sophisticated analysis and development of graphic-intensive, easily accessible software suites.

Equalis 2011 – present
Featured blogger at the Mathematics Community of Equalis (`www.equalis.com`)

University of South Carolina 2007 – present
Graduate Student Organization Program for Fall 2008. Co-organization of Workshop "Getting to Know the Courses" with Prof. A. Schep.

Purdue University 1999-2007
Offered the following services for the Department of Mathematics:

1. Graduate Representative (December 2001–January 2003)
2. Teaching Assistant Peer Mentor (April 2003–July 2005)
3. "Homework on the Web" project (June 2003–July 2005)

ONCE September 1998–May 1999
Part of a program between ONCE (*Organización Nacional de Ciegos Españoles*, the Spanish Blind Society) and the *Universidad Complutense de Madrid*. Recording to audio tapes several textbooks used in Mathematics Lectures at the Department of Mathematics.

Publications

Accepted for publication
F. J. Blanco-Silva, *Sobre demostración automática de un problema geométrico.* Bol. Asoc. Prof. Puig Adams (October 1999) 78–81.

F. J. Blanco-Silva, S. Gruver, C. Rizcalla, *Modeling the impact of Ebola and bushmeat hunting on western lowland gorillas.* EcoHealth (June 2007).

P. Binev, F. J. Blanco-Silva, D. Blom, W. Dahmen, P. Lamby, R. Sharpley and T. Vogt, *High Quality Image Formation by Nonlocal Means Applied to High-Angle Annular Darkfield Scanning Transmission Electron Microscopy (HAADF-STEM).*

Modeling Nanoscale Imaging in Electron Microscopy, Springer, New York, 2012. ISBN 978-1-4614-2190-0

F. J. Blanco-Silva, *Curvelet elements for low frequency analysis.* (accepted for publication in the Missouri Journal of Mathematical Sciences)

Under review

P. Binev, F. J. Blanco-Silva, D. Blom, W. Dahmen, R. Sharpley and T. Vogt, *Super-resolution image reconstruction by nonlocal means applied to high-angle annular darkfield scanning transmission electron microscopy.* (submitted—preprint available)
`imi.cas.sc.edu/IMI/resources/technical-reports/2009/reports/0906.pdf`

F. J. Blanco-Silva, *A Generalized Curvelet Transform. Approximation Properties.* (submitted—preprint available)
`imi.cas.sc.edu/IMI/resources/technical-reports/2008/reports/0806.pdf`

F. J. Blanco-Silva, *Equivalence of smoothness spaces by means of frames of discrete shearlets on the cone and curvelets.* (in preparation)

Expository and Research Talks

Equivalence of Smoothness spaces by means of frames of discrete shearlets on the cone and curvelets. Mathematics Colloquium, Augusta State University. Augusta (Georgia, USA) Nov 2011.

Super-resolution reconstruction in HAADF STEM. SEMS Anual Meeting. Charleston (South Carolina, USA) May 2010.

Super-resolution reconstruction in HAADF STEM. Institut für Geometrie und Praktische Mathematik. RWTH Aachen University. (Aachen, Germany) July 2009.

Equivalence of smoothness spaces by means of frames of discrete shearlets on the cone and curvelets. 33$^{\text{rd}}$ SIAM Southeastern-Atlantic Section Conference. University of South Carolina, Columbia (South Carolina, USA) April 2009.

Super-resolution Reconstruction in Electron Microscopy. IMI and Nanocenter International Seminar Series 2009—Imaging in Electron Microscopy. University of South Carolina, Columbia (South Carolina, USA) April 2009.

Smart Multi-scale Nano-Imaging. SC08 International Conference for High Performance Computing, Networking, Storage and Analysis. Austing Convention Center, Austin (Texas, USA) November 2008.

The Hunt for a Bellman Function. Analysis Seminar. University of South Carolina, Columbia (South Carolina, USA) September 2008.

Edge Detection using the Hidden Markov Tree Model for the Complex Wavelet Transform. IMI Seminar. IMI, University of South Carolina, Columbia (South Carolina, USA) May 2008.

Analysis of point, line and corner singularities with the Dual-Tree Complex Wavelet Transform. IMI Seminar. IMI, University of South Carolina, Columbia (South Carolina, USA) April 2008.

Mathematical Imaging. Computational Nano Meeting. Nanotechnology Center, University of South Carolina, Columbia (South Carolina, USA) Feb-March 2008.

Hilbert Transform Pairs of Wavelets. Classical Analysis and Approximation Theory Seminar. Department of Mathematics, University of South Carolina. Columbia (South Carolina, USA) October 2007.

The Dual-Tree Complex Wavelet Transform. IMI Seminar. Department of Mathematics, University of South Carolina. Columbia (South Carolina, USA) September 2007.

Function Spaces via Curvelet Decompositions. IMI Seminar. Department of Mathematics, University of South Carolina, Columbia (South Carolina, USA) May 2007.

An Alternative Construction of Curvelets. Applications to Characterization of Regularity. Simpòsio Sobre Problemas Inversos Honrando Alberto Calderón. IMPA, Rio de Janeiro (Brazil) January 2007.

Curvelets and Approximation Theory. Seminar. Institute of Mathematics and its Applications (IMA), University of Minnesota, Minneapolis (Minnesota, USA) 2006.

Poster Sessions

Wavelets vs. Curvelets—Mathematical Models for Natural Images. Workshop of Natural Images (together with Bradley J. Lucier). IMA, University of Minnesota, Minneapolis (Minnesota, USA) 2006.

Applications of the Curvelet Transform to Imaging. The Society of Sigma Xi Graduate Student Research Poster Competition, Purdue University, West Lafayette (Indiana, USA) 2006.

Modeling the impact of Ebola and bushmeat hunting on western lowland gorillas. The Society of Sigma Xi Graduate Student Research Poster Competition, Purdue University, West Lafayette (Indiana, USA) 2006.

Conferences, Courses and Seminars

2011 Joint Mathematics Meetings, January 2011. New Orleans (Louisiana, USA)

SEMS Annual Meeting, May 24–26, 2010. Charleston (South Carolina, USA)

2010 Project Review Meeting of the Geo-Mathematical Imaging Group, April 2010. Purdue University. West Lafayette (Indiana, USA)

IMI and Nanocenter International Seminar Series 2010—Imaging in Electron Microscopy, February 2010. University of South Carolina. Columbia (South Carolina, USA)

33$^{\text{rd}}$ Annual SIAM Southeastern-Atlantic Section Conference, April 2009. University of South Carolina. Columbia (South Carolina, USA)

IMI and Nanocenter International Seminar Series 2009—Imaging in Electron Microscopy, February–April 2009. University of South Carolina. Columbia (South Carolina, USA)

SC08 International Conference for High Performance Computing, Networking, Storage and Analysis, November 2008. Austin Convention Center, Austin (Texas, USA)

Hot Topics Workshop: Multi-Manifold Data Modeling and Applications, October 2008. IMA, University of Minnesota. Minneapolis (Minnesota, USA)

SIAM Conference on Imaging Science, July 2008. San Diego (California, USA)

Image Analysis Challenges in Molecular Microscopy, January 2008. IPAM, UCLA. Los Angeles (California, USA)

Symposium on Inverse Problems Honoring Alberto Calderón, January 2007. IMPA. Rio de Janeiro, Brazil.

IMA Thematic Year on Imaging, (workshop series) August 2005–June 2006. IMA, University of Minnesota. Minneapolis (Minnesota, USA)

International Conference on the Interactions between Wavelets and Splines in Honor of Professor Charles K. Chiu's 65th Birthday, May 2005. University of Georgia. Athens (Georgia, USA)

IMA 2002 Summer Program for Graduate Students in Scientific Computing, July 2002. University of Kentucky. Lexinton (Kentucky, USA)

- Parallel Computing and Visualization, with Profs. C. C. Douglas and J. Zhang (University of Kentucky).
- Numerical Methods for Partial Differential Equations, with Profs. Jean Roberts and Jerome Jaffre (INRIA).
- Sparse Matrix Methods, with Prof. Iain Duff (Rutherford Appleton Laboratory).
- ACTS, with Profs. Tonny Drummond and Osni Marques (Lawrence Berkeley National Laboratory).
- Bioinformatics, with Prof. Tony Kazic (University of Missoury-Columbia)

2001 Annapolis Algebraic Geometry Conference, October 2001. U.S. Naval Academy. Annapolis (Maryland, USA)

AISC 2000 on Artificial Intelligence and Symbolic Computation, (conference) July 2000. Universidad Complutense de Madrid. Madrid, Spain.

IMACS'99 on Applications of Computational Algebra, (conference) July 1999. Universidad Complutense de Madrid. San Lorenzo del Escorial (Madrid, Spain)

Multifractals—Mathematics and Applications, (symposium) January 1999. Isaac Newton Institute. Cambridge, UK.

Curves and Surfaces for Computer Aided Geometric Design, (seminar) December 1997–June 1998. CSIC. Madrid, Spain.

Conference on Riemann Surfaces, July 1998. UNED. Madrid, Spain.

Corso Estivo di Matematica, (summer course) July–August 1997. Scuola Matematica Interuniversitaria. Perugia, Italy.

- Algebraic Topology with Prof. K. Gruenberg (London University, UK)
- Differential Geometry with Prof. G. Thorbergsson (Universität zu Köln, Germany)