

Fumiko Futamura

Southwestern University
Department of Mathematics and Comp. Science
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EDUCATION

- Ph.D.*, Mathematics, Vanderbilt University May 2007
Advisor: Professor Akram Aldroubi
Dissertation: Localized Operators and the Construction of Localized Frames
- M.S.*, Mathematics. Vanderbilt University May 2004
- B.A.*, Mathematics. University of Louisville May 2002
Minor: Fine Arts
Graduated Summa Cum Laude, 3.94 GPA
Advisor: Professor Robert Powers
Honors thesis: On the Use of Polygonal Diagrams to Depict Finite Affine Planes

POSITIONS HELD

- Associate Professor of Mathematics, Southwestern University 2013–present
- Assistant Professor of Mathematics, Southwestern University 2007–2013

PUBLICATIONS

- A. Crannell, M. Frantz, F. Futamura, *The image of a square*, Am. Math. Monthly, accepted (2016).
- A. Crannell, M. Frantz, F. Futamura, *The cross ratio as a shape parameter for Dürer's solid*, J. Math. Arts 8 no. 3-4, (2014) 111–119. (on the shortlist of four papers considered for the 2016 JMA Outstanding Paper Award)
- A. Crannell, M. Frantz, F. Futamura, *Dürer: Disguise, Distance, Disagreements, and Diagonals!* reprinted in: The Best Writing on Mathematics 2015, Princeton University Press, 2015.
- A. Crannell, M. Frantz, F. Futamura, *Dürer: Disguise, Distance, Disagreements, and Diagonals!* Math Horiz. 22 no. 2, (2014) 811, 25.
- R. Denman, F. Futamura, K. Richards, *On sharp frame diagonalization*, Lin. Alg. Appl., 438 no. 5, (2013) 2210–2224.
- F. Futamura, *Frame Diagonalization of Matrices*, Lin. Alg. Appl., 436 no. 9, (2012) 3201–3214.

F. Futamura, *Localizable operators and the construction of localized frames*, Proc. Amer. Math. Soc., 137 (2009) 4187-4197.

F. Futamura, *Symmetrically localized frames and the removal of subsets of positive density*, J. Math. Anal. Appl., 326 no. 2, (2007) 1225-1235.

F. Futamura, *Banach framed, decay in the context of localization*, Sampl. Theory Signal Image Process., 6 no. 2, (2007) 151-166.

GRANTS AND AWARDS

Awarded \$500, Visual Thinking for Engaged Learning Grant 2014
A grant, part of the Presidential Innovation Grant, to incorporate visual thinking into Geometry and give a community presentation.

Awarded \$69,432, NSF grant DUE-1140113 2012
A two-year grant to write a textbook, Perspective Geometry: Projective Geometry Applied to Perspective Art (together with co-PI Annalisa Crannells portion, \$108,414), one of 125 awards out of 1050 TUES-I proposals submitted in May 2011

Awarded \$4000, AIBL Small Grant 2011
a grant to create an IBL math and art course, Educational Advancement Foundation

Awarded \$850, Competitive Faculty Development Grant 2010
Internal grant to attend a conference, Southwestern University

Awarded \$700, Abercrombie Faculty Enrichment Fund 2009
Internal grant to do research with colleagues in Nashville, TN, Southwestern University

Awarded \$7590, Faculty-Student Project Research Grant 2009
Internal grant to do research with a student for 8 weeks, Southwestern University

Awarded \$9000, Brown Innovations in Teaching Award 2008
Internal grant to organize a departmental pedagogical seminar, Southwestern University

B.F. Bryant Prize for Excellence in Teaching 2007
Graduate teaching award, Vanderbilt University

Graduate Teaching Assistantship 2002-07
Vanderbilt University

Summer Research Assistantship with A. Aldroubi 2005-06
Vanderbilt University

Selected visual artist participant 2006
Judy Chicago and Donald Woodman's participatory art pedagogy project,

the Multimedia Project of Discovery, Vanderbilt University

Research Assistantship with M. Neamtu 2002-03
Vanderbilt University

Phi Beta Kappa Award 2002
University of Louisville

Mary Ruth Brookover Award, Top Senior in Mathematics 2002
University of Louisville

Robert J. Bickel Scholarship, Top Junior in Mathematics 2002
University of Louisville

WORKSHOPS AND MINICOURSES ORGANIZED

Seeing the Abstract: Visual Thinking for Discovery Learning Apr 2015
Southwestern University

Hyperbolic Crochet community workshop Dec 2014
Art.Science.Gallery, Austin, TX

Mathematical Origami Ornaments community workshop Dec 2013, 2014
Art.Science.Gallery, Austin, TX

MAA Minicourse with Annalisa Crannell and Marc Frantz
Visualizing Projective Geometry Through Photographs and Drawings,
MathFest, Columbus, OH Aug 2016
Joint Mathematics Meetings, Baltimore, MD Jan 2014
Joint Mathematics Meetings, New Orleans, LA Jan 2013

Brown Innovations in Teaching Workshop on Teaching and Learning Fall 2009
Southwestern University

PRESENTATIONS

Conference and Seminar Talks:

Finding the Viewpoint at a Museum: a How-To Guide Jan 2016
Joint Mathematics Meetings, Seattle, WA

How to Mathematically Immerse Yourself in a Work of Art
Infinite Horizons Lecture Series, Kennesaw State University Apr 2015
Mathematics and Statistics Colloquium, Sam Houston State University Mar 2015

Harmonic ratios: music and art in an inquiry-based Geometry course. Jan 2015
Joint Mathematics Meetings, San Antonio, TX

Harmonics in Math, Art and Music Nov 2013

THINK! Series, Southwestern University

- Drawing Chords in Perspective: Harmonic Sets in Math, Music & Art*, invited talk
Department Seminar, Franklin & Marshall College Mar 2012
- The Mathematics of Wonderland*
MAA Student Chapter, Southwestern University Feb 2012
- Drawing Humpty Dumpty in Perspective, Philosophy, Math, Art and Music*
MAA Student Chapter, Southwestern University Feb 2011
- Exploring Diagonalizable and Localizable Operators*, invited talk
Analysis Seminar, University of Houston Jan 2011
- Frame multipliers and commutative Banach algebras*, invited talk
AMS Sectional Meeting, St. Paul, MN Apr 2010
- Approximate Joint Diagonalization of Matrices*, invited talk
AMS Sectional Meeting, Boca Raton, FL Oct 2009
- Drawing Humpty Dumpty in Perspective: Side Topics in Projective Geometry*,
MAA MathFest 2009, Portland, OR Aug 2009
- Creating a Culture of Pedagogical Learning*,
MAA MathFest 2009, Portland, OR Aug 2009
- On Diagonalizable and Almost Diagonalizable Operators*, invited talk
Analysis Seminar, University of Houston Sept 2007
- Localized Frames and Localizable Operators*, invited talk
Wavelets XII Conference, SPIE Optics and Photonics, San Diego, CA Aug 2007
- Localized Operators and the Construction of Localized Frames*
Analysis Seminar, Texas A&M University Oct 2006
Computational Mathematics Seminar, Sam Houston State University. Oct 2006
Analysis Seminar, University of Houston Oct 2006
Computational Analysis Seminar, Vanderbilt University Sept 2006
Intl. Conf. of Harmonic Analysis and Applications, San Luis, Argentina Aug 2006
- Intersections and Parallels, How an Artist Sees Mathematics*
MAA Student Chapter, Sam Houston State University Oct 2006
- How to Win at Dots and Boxes Using Combinatorial Game Theory*
Vanderbilt Math Club, Vanderbilt University Sept 2006
- Symmetrically Localized Frames*
Current Trends in Harmonic Analysis and Its Applications: Wavelets and Frames
University of Colorado at Boulder May 2006

- Mathematical Influences in Art, from Picasso to Escher to Man Ray* Oct 2005
Undergraduate Seminar in Mathematics, Vanderbilt University
- Whistling Girls and Crowing Hens:
Women in Mathematics from Ancient to Modern Times* May 2005
joint talk with Dr. Jo Ann Staples,
Undergraduate Seminar in Mathematics, Vanderbilt University
- The Poincaré Conjecture* Mar 2005
Vanderbilt Math Club, Vanderbilt University
- On Localized Frames* Mar 2005
Computational Analysis Seminar, Vanderbilt University
Intl. Conf. on Modern Methods of Time-Frequency Analysis, Strobl, Austria May 2005
Southeastern Sectional Meeting, Western Kentucky University Mar 2005
- Phi = 1.61803399...* Nov 2004
Undergraduate Seminar in Mathematics, Vanderbilt University
- On the Use of Polygonal Diagrams to Depict Finite Affine Planes* May 2002
Annual Meeting of KYMAA, Georgetown College, KY
- Invited Participant:**
- Workshop, “Frames for the finite world: Sampling, coding and quantization” Aug 2008
American Institute of Mathematics, Palo Alto, CA, 2008
- Poster presentation, *Localized Operators and the Construction of Localized Frames* Jan 2007
AWM Workshop for Women Graduate Students and Recent PhDs,
Joint Mathematics Meetings, New Orleans, LA
- Art Exhibits:**
- Dissected Pigeon* Mar 2012
crocheted sculpture, yarn and polyfill, 6 in×3 in
Interdisciplinary Craft as Art, a King Creativity Project
headed by M.A. Atkins, A. Budincich, and E. Manning, Southwestern University
- Self-Portraits as Other People’s Preconceptions* Apr 2006
installation of eight paintings, oil on canvas, 60 in×36 in
Evoke/Invoke/Provoke, A Multimedia Project of Discovery
Headed by Judy Chicago and Donald Woodman, Vanderbilt University
- Meret’s Nambu* Apr 2004
painting, oil on canvas, 50 in×30 in,
Sarratt Student Art Show, Vanderbilt University
- Mentally bound* Apr 2002
sculpture piece, wax; cheesecloth; wood; chicken wire, 52 in×25 in×28 in
Student Art Show, University of Louisville

TEACHING EXPERIENCE

Courses:

Explorations in Mathematics (Paideia Representing Gender cluster course)
Mathematical Concepts (as Mathematical Influences in Art)
Introduction to Statistics
Elementary Function Theory
Hidden Perspectives: Mathematics in Art and Art in Mathematics, First Year Seminar
Mathematical Influences in Art, London Semester Program
Victorian Mathematics and Society in Wonderland and Flatland, London Semester Program
Calculus I
Calculus II
Calculus III
Accelerated Calculus I, Vanderbilt University
Accelerated Calculus II, Vanderbilt University
Linear Algebra
Real Analysis I
Real Analysis II
Algebraic Structures I
Algebraic Structures II
Projective Geometry
Geometry
Frame Theory

Independent Study:

Quaternion Julia Set
Mathematics of Wonderland
Image Processing: Fourier Analysis, Wavelet Analysis and Compressed Sensing
Projective Geometry: Perspective Drawing, Philosophy, Axiomatic Proof, Algebraic Geometry
Mathematical background for an iphone app: geometry and music
Mathematics of Wonderland

Paideia Program:

Participant in new Paideia. Theme: Representing Gender 2013-2016
10 student cohort. Theme: Creativity 2012-2015

Honors Thesis Advising:

On the Convergence of Infinite Series and Products, Sean Watson 2010
Super Resolution Image Construction, Tommy Rogers 2010

Project Advising:

Solar Powered Lounge Chair 2014-2015
 Keeley Coburn, Amir Hessabi, Chandler Johnson, Creativity Paideia Cohort

AIDS Through Music, King Creativity Project 2013
 Phil Wozny, Rachel DeLong, Michelle Moses, Winston Myers, Stinson Seuser

Professional training:

<i>Inquiry Based Learning Workshop</i> Austin, TX	Jul 2009
<i>MAA minicourse: Perspective Viewing and Drawing Make Good Math Problems</i> MAA MathFest 2008, Madison WI	Jul 2008
<i>Project NExT (New Experiences in Teaching) workshop,</i> Cooperative Learning in Undergraduate Mathematics MAA MathFest 2008, Madison, WI	Jul 2008
<i>Texas Section Project NExT Fall Meeting</i> Sam Houston State University	2007-08
<i>Texas Section Project NExT Fellow</i>	2007-08
<i>Professor 101, workshop for new professors</i> Vanderbilt University Center for Teaching	Apr 2007
<i>GradSTEP (Graduate Student Teaching Event for Professional Development)</i> Vanderbilt University Center for Teaching	2005-07
<i>Professional Development Working Group</i> Vanderbilt University Center for Teaching	2005
<i>Group Student Analysis participant</i> Vanderbilt University Center for Teaching	2003-06
<i>Teaching Assistant Orientation Workshop</i> Vanderbilt University Center for Teaching	2002

COMMUNITY INVOLVEMENT**Southwestern University:**

<i>Chair and Natural Science Rep., Enrollment and Retention Committee</i>	2014-2016
<i>Member, Hiring Committee for Visiting Assistant Professor Position</i>	2014
<i>Natural Science Rep., Staff Affairs Council</i>	2009-2010, 2014
<i>Natural Sciences Rep., Brown Scholars Committee</i>	2012-2013
<i>Webmaster, Department Website</i>	2008-2014
<i>Faculty advisor, Southwestern University Math Club MAA Chapter</i>	2007-2014
<i>Natural Sciences Rep., Presidents Retirement-Events Planning Committee</i>	2012-2013

<i>Faculty Rep.</i> , Paideia Committee	2010-11
<i>Natural Sciences Rep.</i> , Interdisciplinary QEP Proposal Committee	2010
<i>Editor</i> , Staff Affairs Council Newsletter	2009-2010
<i>Webmaster</i> , Department Website	2008-present
<i>Natural Sciences Rep.</i> , Student Media Board	2008-2009
<i>Member</i> , Hiring Committee for Tenure-track Computer Science Position	2007
Beyond Southwestern:	
<i>Learning session leader</i> Operation Math Girls Conference, Sam Houston State University, Huntsville, TX	2016
<i>Advisory board member</i> Studio 360 Science and Creativity Series, Sloan Foundation, New York, NY	2015-present
<i>Advisory board member</i> Art.Science.Gallery, Austin, TX	2013-present
<i>Volunteer with FYS students to teach mathematics through origami and perspective drawing</i> Benold Middle School, Georgetown, TX	2010
<i>Volunteer to teach origami and platonic solids</i> After school program at Cooper Elementary and Forbes Middle School, Georgetown, TX	2010
<i>Volunteer math tutor and mentor</i> Migrant Program at Georgetown High School, Georgetown, TX	2007-08
<i>Panel member, Mathematics and Mingling: The Undergraduate Math Club</i> Project NExT session at Mathfest 2006, Knoxville, TN	Aug 2006
<i>Graduate student advisor</i> , Vanderbilt University High School Mathematics Competition Vanderbilt University	2006
<i>Co-founder, graduate student advisor</i> , Vanderbilt Math Club Vanderbilt University	2005-07
<i>Volunteer math tutor and mentor</i> through the Pencil Foundation Rose Park Metro Public Middle School, Nashville TN	2005-06
CONFERENCES ATTENDED	
Operator Algebras, Frames, and Undergraduate Research, In Honor of David Larsons 70th Birthday, College Station, TX	July 2012

ISAMA Conference on Math and Art, Chicago, IL	Jun 2010
From Banach Spaces to Frame Theory and Applications, In Honor of Professor Pete Casazza's 65th Birthday, College Park, MD	May 2010
12th Annual Legacy of R.L. Moore Conference, Austin, TX	Jul 2009
National Institute for Technology and Liberal Education (NITLE) Summit San Francisco, CA	Apr 2008
February Fourier Talks University of Maryland, College Park	Feb 2008
3rd Annual Spring Institute on Noncommutative Geometry and Operator Algebras Vanderbilt University	May 2005
Southeastern Sectional Meeting, Special Session on Wavelets and Multiwavelets Western Kentucky University	Mar 2005
MGA Workshop V: Math Analysis and Multiscale Geometric Analysis Institute of Pure and Applied Mathematics (IPAM) at UCLA	Nov 2004
Southeastern Section Meeting, Special Session on Wavelets, Frames, and Sampling Vanderbilt University	Oct 2004
Workshop in Knots and 3-Manifolds Pacific Institute for the Mathematical Sciences, University of British Columbia Vancouver, Canada	Jul 2004
2nd International Conference on Computational Harmonic Analysis Vanderbilt University	May 2004
The 2nd Annual Spring Institute on Noncommutative Geometry and Operator Algebras Vanderbilt University	May 2004
Noncommutative Geometry in Mathematics and Physics CIRM, Luminy, France	Jan 2004

PROFESSIONAL SOCIETIES

American Mathematical Society, Mathematical Association of America

ADDITIONAL INFORMATION

Citizenship: Japan; U.S. permanent resident.

Computer Skills: html, css, Matlab, LaTeX, Maple, Mathematica

Languages Spoken: English (native), Japanese (proficient), Spanish (basic)