

# BRODY DYLAN JOHNSON

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## PERSONAL INFORMATION

Born July 6, 1973, Battle Creek, Michigan, USA.

## EDUCATION

- Ph.D.    *Mathematics*, Washington University in Saint Louis, May 2002.  
Dissertation: *Wavelets: generalized quasi-affine and oversampled-affine frames*.  
Chairman: Guido L. Weiss.
- A.M.    *Mathematics*, Washington University in Saint Louis, May 1999.
- M.S.    *Mechanical Engineering*, Virginia Polytechnic Institute and State University, August 1997.  
Thesis Title: *Control of broadband acoustic radiation from structures using a piezoelectric double-amplifier active-skin*.
- B.S.    *Mechanical Engineering*, Virginia Polytechnic Institute and State University, May 1996,  
*Summa Cum Laude*, Minor: *Mathematics*.

Attended: Hagerstown Junior College, Hagerstown, Maryland.  
Southern Illinois University at Edwardsville, Edwardsville, Illinois.

## PROFESSIONAL EXPERIENCE

- 2003–    Saint Louis University, Saint Louis, Missouri.  
*Associate Chair*, Department of Mathematics and Statistics (2016–).  
*Associate Professor*, Department of Mathematics and Statistics.  
*Assistant Professor*, Department of Mathematics and Computer Science (2003-2009).
- 2002-2003    Georgia Institute of Technology, Atlanta, Georgia.  
*VIGRE Visiting Assistant Professor*, School of Mathematics.

## HONORS AND AWARDS

- 2012    SGA Faculty Excellence Award (SLU)  
2009    Award for Outstanding Service to Undergraduate Students (SLU)  
2008    William V. Stauder, S.J. Award for Excellence in Teaching in the Natural Sciences (SLU)  
2006    SGA Faculty Excellence Award (SLU)  
2005    SGA Faculty Excellence Award (SLU)  
2001-2002    Dean's Dissertation Fellowship (WashU)  
2001    Council of Students of Arts & Sciences Teaching Award (WashU)  
2000-2001    Robert H. McDowell Award for Excellence in the Teaching of Mathematics (WashU)  
1999-2000    Dean's Award for Teaching Excellence (WashU)  
1996    Pratt Fellowship (VaTech)

GRANT(S)

2006 SLU Summer Research Award, *Multiresolution Structure for Rational Dilations*.

PUBLICATIONS IN MATHEMATICS

12. *Sparse recovery using the Discrete Cosine Transform* (with Benjamin Barros), “A Celebration of Guido L. Weiss for his Ninetieth Birthday”, *J. Geom. Anal.* (2021). <https://doi.org/10.1007/s12220-020-00574-0>
11. *Intrinsic four-point properties* (with Edward Andalafte, Raymond Freese, and Rebecca Lelko), *J. Geom.*, **105**(1) (2014), 1–11.
10. *Quincunx wavelets on  $\mathbb{T}^2$*  (with Kenneth R. Hoover), “Wavelets and Multiscale Analysis: Theory and Applications,” *Appl. Numer. Harmon. Anal.*, Birkhäuser/Springer, New York, 2011.
9. *A finite dimensional approach to wavelet systems on the circle*, *Glasnik Matematički, Glasnik Matematički*, **46**(2) (2011), 415–431.
8. *Frame potential and finite abelian groups* (with Kasso A. Okoudjou) “Radon transforms, geometry, and wavelets,” *Contemp. Math.*, **464** (2008), 137–148.
7. *Stable filtering schemes with rational dilations*, *J. Fourier Anal. Appl.*, **13**(5) (2007), 607–621.
6. *Orthogonal wavelet frames and the vector-valued wavelet transform* (with Ghanshyam Bhatt and Eric Weber) *Appl. Comput. Harmon. Anal.*, **23**(2) (2007), 215–234.
5. *The nonholonomy of the rolling sphere*, *Amer. Math. Monthly*, **114**(6) (2007), 500–508.
4. *Convolutional frames and the frame potential* (with Matthew Fickus, Keri Kornelson, and Kasso A. Okoudjou) *Appl. Comput. Harmon. Anal.*, **19**(1) (2005), 77–91.
3. *Co-affine systems in  $\mathbb{R}^d$* , “Wavelets, frames and operator theory,” *Contemp. Math.*, **345** (2004), 193–202.
2. *On the oversampling of affine wavelet frames*, *SIAM J. Math. Anal.*, **35**(3) (2003), 623–638.
1. *On the relationship between quasi-affine systems and the à trous algorithm*, *Collect. Math.*, **53**(2) (2002), 187–210.

OTHER PUBLICATIONS

2. *Broadband control of plate radiation using a piezoelectric, double amplifier active skin and structural acoustic sensing*, (with Chris R. Fuller) *J. Acoust. Soc. Am.*, **107**(2) (2000), 876–884.
1. *A broadband passive-active sound absorption system*, (with Jerome P. Smith and Ricardo A. Burdisso) *J. Acoust. Soc. Am.*, **106**(5) (1999), 2646–2652.

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## TEACHING EXPERIENCE (at Saint Louis University)

Most courses are listed in the format: Term  $\times$  Number of Students.

- CSCI 1060 Scientific Programming: F05 $\times$ 7, S07 $\times$ 21, F07 $\times$ 17, S08 $\times$ 25, S08 $\times$ 23, S09 $\times$ 15, S13 $\times$ 23.
- STAT 1300 Elementary Statistics with Computers: Su13 $\times$ 8.
- MATH 1400 Precalculus: S09 $\times$ 18.
- MATH 1510 Calculus I: F03 $\times$ 26, F09 $\times$ 24, F13 $\times$ 28, F14 $\times$ 26, F15 $\times$ 27.
- MATH 1520 Calculus II: S04 $\times$ 22, S05 $\times$ 27, S10 $\times$ 21, S14 $\times$ 28, S15 $\times$ 30.
- MATH 1660 Discrete Mathematics: S16 $\times$ 25.
- MATH 2530 Calculus III: F03 $\times$ 27, F04 $\times$ 25, F11 $\times$ 20, S17 $\times$ 20, F17 $\times$ 30, F19 $\times$ 31, F20 $\times$ 29, S21 $\times$ 26.
- MATH 2980 Independent Study: Introduction to Fourier Analysis (S05 2 credits).
- MATH 3240 Numerical Analysis: S12 $\times$ 11, S16 $\times$ 15.
- MATH 3550 Differential Equations: S04 $\times$ 26, S05 $\times$ 26, F06 $\times$ 10, Su08 $\times$ 12, F08 $\times$ 21, Su09 $\times$ 7, Su10 $\times$ 13, S11 $\times$ 29, Su11 $\times$ 20, S12 $\times$ 25, Su14 $\times$ 21, F14 $\times$ 31, Su15 $\times$ 15, F17 $\times$ 29, S20 $\times$ 36, S21 $\times$ 30.
- MATH 4210 Introduction to Analysis: F05 $\times$ 11, Su15 $\times$ 1.
- MATH 4220 Metric Spaces: S06 $\times$ 10.
- MATH 4230 Multivariable Analysis: S11 $\times$ 8.
- MATH 4310 Introduction to Complex Variables: F16 $\times$ 7.
- MATH 4550 Nonlinear Dynamics and Chaos Theory: S14 $\times$ 25, S15 $\times$ 15, S18 $\times$ 14.
- MATH 4570 Partial Differential Equations: F04 $\times$ 10, F05 $\times$ 10, F07 $\times$ 12, F08 $\times$ 9, F09 $\times$ 17, F11 $\times$ 28, F12 $\times$ 23, F13 $\times$ 26, F15 $\times$ 22, F16 $\times$ 20, F19 $\times$ 24.
- MATH 4930 Special Topics: S06 $\times$ 11 (Signal & Image Processing), Senior Capstone: S19 $\times$ 4 (Compressive Sensing).
- MATH 5210 Real Analysis: F06 $\times$ 6, F09 $\times$ 5, F12 $\times$ 5, F18 $\times$ 14.
- MATH 522 Real Analysis II (obsolete): S07 $\times$ 4.
- MATH 5220 Complex Analysis: S10 $\times$ 5, S13 $\times$ 5.
- MATH 5230 Functional Analysis: S19 $\times$ 9.
- MATH 6280 Topics in Analysis: S08 $\times$ 4 $\frac{1}{2}$  (Spectral Theory).

## GRADUATE STUDENTS

- August 2020 M.A., *Survey of Deterministic and Probabilistic Methods in Compressive Sensing*, Christian Verghese, S.J.
- August 2018 M.A., *A survey of compressive sensing and sparse recovery*, Benjamin Barros.
- May 2017 M.A., *Compartmental models for disease transmission with migration*, Elizabeth Scofidio.
- May 2013 M.A., *Rationally sampled filter banks*, Gerrit Smith.
- May 2013 M.A., *Stochastic processes and applications to finance*, Shasta Shakya.
- May 2012 M.A., *Approximate Schauder frames for  $\mathbb{R}^n$* , Stephanie Thomas.
- May 2009 M.A., *Biorthogonal wavelet systems on the torus*, Douglas Runge.

## RESEARCH PRESENTATIONS

23. *Frame properties of iterated filter banks*, October 2013, Sunday Workshop connected with the AMS Special Session on Wavelets, Frames, and Related Expansions, Fall Central Sectional Meeting of the AMS, Washington University, October 2013. (30 min.)
22. *A finite-dimensional approach to periodic wavelets*, November 2010, Seminar, Norbert Wiener Center, University of Maryland - College Park, College Park, Maryland. (1 hour)
21. *An introduction to filterbank frames*, October 2010, Analysis Seminar, University of Oregon, Eugene, Oregon. (1 hour)
20. *Quincunx wavelets on  $\mathbb{T}^2$* , December 2009, Wavelet Seminar, Washington University, St. Louis, Missouri. (1 hour)
19. *Another look at periodic wavelets*, May 2009, 20 Years of Wavelets, DePaul University, Chicago, Illinois. (25 min.)
18. *Wavelets on the torus*, April 2009, Computational Analysis Seminar, Vanderbilt University, Nashville, Tennessee. (1 hour)
17. *Frame potential and finite abelian groups*, March 2008, Spring Southeastern Sectional Meeting of the AMS, Special Session on Wavelets, Frames, and Multi-Scale Constructions, Louisiana State University, Baton Rouge, Louisiana. (20 min.)
16. *Characterizations of finite-dimensional tight frames*, November 2007, Analysis Seminar, Iowa State University, Ames, Iowa. (1 hour)
15. *Sampling and upsampling operators in finite abelian group algebras*, September 2007, Wavelet Seminar, Washington University, St. Louis, Missouri. (1 hour)
14. *Stable filtering schemes with rational dilations*,
  - May 2007, 31st SIAM Southeastern-Atlantic Section Meeting, The University of Memphis, Memphis, Tennessee. (20 min.)
  - April 2007, 2nd Illinois/Missouri Applied Harmonic Analysis Meeting, Washington University in St. Louis, St. Louis, Missouri. (40 min.)
13. *Frame decompositions of PSI spaces with rational dilations*,
  - January 2007, Workshop on Harmonic and Geometric Analysis and Applications, Louisiana State University, Baton Rouge, Louisiana. (25 min.)

- October 2006, Wavelet Seminar, Washington University, St. Louis, Missouri. (1 hour)
- 12. *Projective multiresolution analysis for rational dilations*, May 2006, Analysis Seminar, University of Oregon, Eugene, Oregon. (1 hour)
- 11. *Orthogonal wavelet frames and vector-valued discrete wavelet transforms*, May 2006, Current Trends in Harmonic Analysis and Its Applications: Wavelets and Frames, University of Colorado at Boulder, Boulder, Colorado. (20 min.)
- 10. *Basic applications of wavelets*, March 2005, Wavelet Seminar, Washington University, St. Louis, Missouri. (1 hour)
- 9. *Shift-invariant frames and the frame potential*, June 2004, ShowMe Analysis Seminar 2004, University of Missouri-Columbia, Columbia, Missouri. (25 min.)
- 8. *Nonseparable bidimensional filter banks associated with oversampled wavelet transforms*, May 2004, Second International Conference on Computational Harmonic Analysis, Vanderbilt University, Nashville, Tennessee. (30 min.)
- 7. *Convolutional frames and the frame potential*, March 2004, Washington University and University of Zagreb Workshop on Wavelets, Washington University, Saint Louis, Missouri. (1 hour)
- 6. *Multiresolution operators in wavelet theory*, April 2003, Analysis Seminar, Georgia Institute of Technology, Atlanta, Georgia. (1 hour)
- 5. *Co-affine systems in  $\mathbb{R}^d$* , March 2003, Spring Southeastern Sectional Meeting of the AMS, Special Session on Frames, Wavelets, and Tomography, Louisiana State University, Baton Rouge, Louisiana. (25 min.)
- 4. *Oversampling wavelet frames*, January 2003, Wavelets, Frames, and Operator Theory Workshop, University of Maryland at College Park, College Park, Maryland. (30 min.)
- 3. *Quasi-affine systems based on the à trous algorithm*, December 2001, 18<sup>th</sup> Auburn Mini-conference on Harmonic Analysis and Related Areas, Auburn University, Auburn, Alabama. (20 min.)
- 2. *The use of a piezoelectric double amplifier active-skin in the control of panel radiation*, June 1997, Joint Meeting: 133<sup>rd</sup> Acoustical Society of America Meeting and NOISE-CON '97, Pennsylvania State University, State College, Pennsylvania, *J. Acoust. Soc. Am.*, **101**(5), pp. 3108, May 1997. (15 min.)
- 1. *Control of structural radiation with an integrated, piezoelectric double amplifier skin*, April 1997, 1997 Office of Naval Research Transducer Materials and Transducers Workshop, Pennsylvania State University, State College, Pennsylvania. (15 min.)

## PEDAGOGICAL PRESENTATIONS

9. *The Physics of Bowling: How Good Bowlers Stay off the Straight and Narrow*, April 2012, Math Club, Webster University, St. Louis, Missouri. (1 hour)
8. *The hat problem*, November 2010, Math Club, Mary Baldwin College, Staunton, Virginia. (1 hour)
7. *A Mathematical Glance at Zombie Infestation*, October 2010, Undergraduate Seminar, University of Oregon, Eugene, Oregon. (1 hour)
6. *An Introduction to Frame Theory*, October 2010, Fort Lewis College, Durango, Colorado. (1 hour)
5. *What is Chaos?*, April 2008, Mathematics Teacher Circle, Washington University, Saint Louis, Missouri.
4. *The nonholonomy of the rolling sphere*, June 2006, REU Smorgasbord Seminar, Cornell University, Ithaca, New York. (1 hour)
3. *An introduction to wavelets*, November 2001, Math Club, McKendree College, Lebanon, Illinois. (1 hour)
2. *Probability in dungeons and dragons*, November 2001, Math Circles Discussion, Washington University, Saint Louis, Missouri. (Math Circles involves interactive discussions in which middle-school students are exposed to interesting mathematical topics.)
1. *The hat problem*, October 2001, Math Club, Washington University, Saint Louis, Missouri. (1 hour)