

VITAE - RELEVANT TO MATHEMATICAL RESEARCH

JANET CRANDELL TREMAIN

1. PERSONAL

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2. EDUCATION

B.S. Southwest Missouri State University, Springfield, MO (1979).
Major: Mathematics
Graduated *magna cum laude*.

Attended the University of Missouri, Rolla 1979-1981 (Summers).
Major: Mathematics

M.S. University of Missouri, Columbia, MO (1985)
Major: Logic

Mathematical Tripos - Part III, Certificate of Advanced Study in Mathematics (*with honors*), Trinity College, University of Cambridge, England (1991).

Graduate School in Mathematics, University of Minnesota, Minneapolis,
(150 graduate and research hours).

3. PROFESSIONAL EXPERIENCE

2007-Present, Senior Researcher, **The Frame Research Center**, University of Missouri: <http://www.framerc.org>

Research Team at the **Fusion Frame Research Center**: <http://www.fusionframes.org>

2000-7, Instructor, Department of Mathematics, The University of Missouri.

Electronic testbank designer for a calculus text for Prentice Hall.

Wrote electronic test banks for calculus book companies, and the first electronic business calculus for the University of Missouri.

1993-1995, Research Assistant, School of Mathematics, The University of Minnesota.

1991-1993, Teaching Assistant, School of Mathematics, The University of Minnesota.

1982-83, Teaching Assistant, Department of Mathematics, The University of Missouri - Columbia.

1979-81, Mathematics Teacher, Buffalo High School, Buffalo, MO. (Taught basic skills for the state exams, general math, algebra, geometry, trigonometry, consumer math and tutored students for college calculus).

4. AREAS OF INTEREST

Combinatorics, Applications of Hilbert space frames, Equiangular Frames.

5. HONORS AND AWARDS

Outstanding Greek Faculty Award (2003).
Math Honor Society
Education Honor Society

6. GRANTS

NSF DMS Applied Math: Applications of frames to problems in mathematics and engineering. 1007-1010. Senior Researcher on the grant. PI: Dr. Peter G. Casazza.

NSF ATD: Algorithms for Threat Detection. 2010-2016. Senior Researcher on the grant. PI: Dr. Peter G. Casazza.

NSF Applied Mathematics/Digital Signal Processing/Computational Mathematics : Applications of frames to problems in mathematics and engineering. 2007-2010. Senior Researcher on the grant. PI: Dr. Peter G. Casazza

7. RESEARCH AND PUBLICATIONS

1. J.C. Tremain, A conceptual framework for belief, MS Thesis, University of Missouri (1985).
2. J.C. Tremain, The Jerusalem Ticket Problem, *American Math. Monthly* **95** No. 7 (1988) pp. 443-447.
3. J.C. Tremain, Symmetry classes of alternating sign matrices, plane partitions, and lattice paths, *Seminarie d'Initiation a l'Analyse*, 34e, Expose No. 19, (14 pages) *Publications Mathematiques de l'Universite Pierre et Marie Curie*, 117 (1994-1995).
4. P.G. Casazza, M. Fickus, M. Leon, J. Kovacevic and J.C. Tremain, Physical laws governing finite tight frames, *Proceedings SPIE, San Diego: Wavelets: Applications in signal and image processing, X*, M.A. Unser, A. Aldroubi, and A.F.Laine Eds. **5207** (2003) 371-380.
5. P.G. Casazza, M. Fickus, M. Leon, J. Kovacevic and J.C. Tremain, Representations of frames, Preprint.
6. P.G. Casazza, M. Fickus, M. Leon and J.C. Tremain, Constructing infinite tight frames, Preprint.
7. P.G. Casazza, M. Fickus, M. Leon, J. Kovacevic and J.C. Tremain, A physical interpretation for finite tight frames, *Harmonic Analysis and Applications (In honor of John Benedetto)*, C. Heil, Ed. Birkhauser (2006) 51-78.
8. P.G. Casazza and J.C. Tremain, The Kadison-Singer problem in mathematics and engineering, *Proceedings of the National Academy of Sciences* **Vol. 103** No. 7 (2006) 2032-2039.
9. P.G. Casazza, M. Fickus, J.C. Tremain and E. Weber, The Kadison-Singer problem in mathematics and engineering, Part II: A detailed account. *Contemporary Math.* **Vol. 414** Operator theory, operator algebras and applications, D. Han, P.E.T. Jorgensen and D.R. Larson Eds. (2006) 297-356.
10. P.G. Casazza, G. Kutyniok, D. Speegle and J.C. Tremain, A decomposition theorem for frames and the Feichtinger Conjecture, *Proc. AMS* **36** (2008) 2043-2053.
11. P.G. Casazza and J.C. Tremain, The paving conjecture is equivalent to the paving conjecture for triangular matrices, preprint.

12. P.G. Casazza and J.C. Tremain, Revisiting the Bourgain-Tzafriri restricted invertibility theorem, *Operators and Matrices*, **3** No. 1 (2009) 97-110.
13. P.G. Casazza, D. Redmond and J.C. Tremain, Real Equiangular Frames, Proceedings of the CISS Meeting, Princeton University - Electrical Engineering Department (2008).
14. J.C. Tremain, Concrete constructions of equiangular line sets, Preprint.
15. J.C. Tremain, Concrete constructions of equiangular line sets II, Preprint.
16. J.C. Tremain, Intelligence, Creativity and Conformity, Preprint.
17. M. Fickus, D. Mixon and J.C. Tremain, Steiner equiangular tight frames, *Linear Algebra and Applications* **436** (2012) 1014-1027.
18. J.C. Tremain, Algorithmic constructions of unitary matrices and tight frames, Preprint.
19. M. Fickus, D.G. Mixon and J.C. Tremain, *Constructing a large family of equiangular tight frames*, Proceedings of SAMPTA (2011).
20. B.G. Bodmann, P.G. Casazza, J. Peterson, I. Smalyanau, and J.C. Tremain, Equi-isoclinic fusion frames and mutually unbiased basic sequences, to appear.
21. P.G. Casazza, M. Fickus, D. Mixon and J.C. Tremain, The Bourgain-Tzafriri Conjecture and concrete constructions of non-pavable projections, *Operators and Matrices*, **5** No. 2 (2011) 351-363.
22. J.C. Tremain and C. Vaidyanathan, An elementary representation of all real Hessenberg unitary matrices, preprint.
23. P.G. Casazza, R. Lynch, J.C. Tremain and L. Woodland, Integer Frames, preprint.

8. MEETINGS ATTENDED AND TALKS

1. April 12, 1985. Talk at the Missouri MAA meeting, Warrensburg, MO. Title: A mathematical model for human thought.
2. April 3-4, 1987. Attended the regional MAA meeting in Kirksville, MO. Talk: The Jerusalem Ticket Problem.

3. March 4, 1993. Combinatorics seminar talk, University of Minnesota.
Title: A symmetry class of plane partitions.
4. January 27, 1994. Graduate Seminar talk, University of Minnesota.
Title: An introduction to Cohen-Macaulay partially ordered sets.
5. February 17, 1994. Combinatorics Seminar talk, University of Minnesota.
Title: Hidden relations in symmetry classes of plane partitions.
6. February 7, 1995. Seminar talk, University of Iceland.
Title: Plane partitions and alternating sign matrices.
7. April 10, 1995. hour address to the Danish Mathematical Society's annual meeting, Copenhagen, Denmark.
Title: Teaching calculus with Mathematica.
8. May 4, 1995. Talk in the Choquet Seminar, University of Paris.
Title: Alternating sign matrices as plane partitions.
9. May 11, 1995. Colloquium talk at Odense University, Denmark.
Title: Teaching calculus with Mathematica.
10. October 2, 1995. Combinatorics seminar talk, University of Minnesota.
Title: Krattenthaler's non-crossing lattice path technique.
11. March 25, 1996. Joint talk with P.G. Casazza, Al-Akhawayn University, Ifrane, Morocco.
Title: Making mathematics interesting in the classroom.
12. March 26, 1996. Seminar talk, Al-Akhawayn University, Ifrane, Morocco.
Title: Alternating sign matrices and plane partitions.
13. February 3, 2005. Gave a plenary address at the international conference: "Harmonic Analysis and Applications", in New Zealand. Title: The Kadison-Singer Problem and the Feichtinger Conjecture.

9. TRAVEL AND MEETINGS ATTENDED

- (1) January 25-28, 1984. Attended the National meeting of the AMS, Louisville, KY.
- (2) April 6-7, 1984. Attended the regional AMS meeting at Notre Dame University, Indiana.
- (3) April 19, 1984. Attended the functional analysis seminar at the university of Illinois, Urbana-Champaign.

- (4) April 21, 1984. Attended the Wabash Conference, Wabash, Indiana.
- (5) June 25-29, 1984. Attended (and helped organize and run) the International conference on Banach space theory, University of Missouri - Columbia.
- (6) July 5-8, 1984. Attended J.J. Uhl's Annual functional analysis seminar, University of Illinois.
- (7) August 7-10, 1984. Attended the international conference on Banach space theory, St. Lawrence University, Canton, N.Y.
- (8) January 9-13, 1985. Attended the national meeting of the AMS, Anaheim, CA.
- (9) April 14-20, 1985. Attended 3 special seminars on Banach space theory at the University of Iowa, Iowa City.
- (10) July 4-7, 1985. Attended J.J. Uhl's annual functional analysis seminar, University of Illinois.
- (11) July 26- August 10, 1985. Attended the international conference on Banach space theory, Kent State University.
- (12) September 25-27, 1985. Visited Christian Albrechts University, Kiel, Germany.
- (13) October 1-5, 1985. Visited Odense University, Odense, DK.
- (14) October 8-16, 1985. Visited the Polish Academy of Sciences, Warsaw, Poland.
- (15) October 20, 1985 - June 12, 1986. Visited the Hebrew University of Jerusalem, Israel.
- (16) October, 1985 - June 12, 1986. Attended the weekly seminar in Banach space theory at the University of Tel Aviv.
- (17) April 13, 1986, Attended the meeting on the Geometry of Banach spaces, The Technion, Haifa, Israel.
- (18) May 4-9, 1986, Visited the Weizman Institute, Rehovot, Israel, to do research.
- (19) June 15 - 20, 1986. Attended the international meeting on Probability in Banach spaces, Sandbjerg, DK.
- (20) June 26, 1986. Visited the University of Zurich, Zurich, Switzerland.
- (21) October 12-18, 1986. Attended the Oberwolfach Program on Banach space theory, Oberwolfach, Germany.
- (22) April 3-4, 1987. Attended the regional MAA meeting, Kirksville, MO.
- (23) April 21-28, 1987. Visited the University of Edmonton, Edmonton, Alberta, Canada.
- (24) May 15-17, 1987. Attended the retirement conference for R.C. James, Kent State University.
- (25) July 5-24, 1987. Attended the Banach space workshop, University of Iowa, IA.

- (26) August 23-29, 1987. Attended the international conference on Banach space theory, Mons, Belgium.
- (27) September 1 - January 1, 1987. Visited Odense University, DK.
- (28) October 16-25, 1987. Attended the International conference on Banach space theory, Warsaw, Poland.
- (29) November 24-29, 1987. Visited the University of Stockholm, Sweden.
- (30) December 8-10, 1987. Visited Christian Albrechts University, Kiel, Germany.
- (31) January 5-9, 1988. Attended the national meeting of the AMS, Atlanta, GA.
- (32) June 17-23, 1988. Attended the International conference on Banach spaces, Banff, Canada.
- (33) June 28-July 9, 1988. Attended the Banach space program, MSRI, Berkeley, CA.
- (34) December 6-11, 1988. Visited the Advanced Institute, Princeton, N.J.
- (35) December 17 - January 5, 1989. Visited the Hebrew University of Jerusalem, Israel.
- (36) May 10 - May 29, 1989. Visited East China Normal University, Shanghai, China, University of Beijing, and Wuhan University, China.
- (37) June 5-9, 1989. Attended the conference on Algebraic Combinatorics, University of Michigan, Ann Arbor.
- (38) June 10-17, 1989. Attended the International conference on the Geometry of Banach spaces, Strobl, Austria.
- (39) October, 20-26, 1989. Visited the University of Cambridge, England.
- (40) October 14-20, 1990. Visited the University of Edinburgh, England.
- (41) October 16-18, 1990. Visited University College, London, England.
- (42) October 22-24, 1990. Visited Oxford University, Oxford, England.
- (43) March 3-5, 1991. Visited the University of York, England.
- (44) May 21-28, 1991. Visited the University of Paris VI, Paris, France.
- (45) May 27-30, 1991. Attended the North British functional analysis meeting, Edinburgh, Scotland.
- (46) June 28-August 1, 1991. Attended the seminar on linear analysis, Texas A&M university, Texas.
- (47) June 12-14, 1992. Attended the national meeting of the Canadian Mathematical Society, Toronto, Canada.
- (48) June 25-July 25, 1992. Attended the seminar on linear analysis and probability, Texas A&M University, Texas.
- (49) September 28-October 2, 1993. Visited the special talks on Banach spaces at the University of Iowa, IA.
- (50) February 10, 1995 - July 25, 1995. Visited Odense University, DK.
- (51) April 17-23, 1995. Visited Universidad Complutense, Madrid, Spain.

- (52) May 15-16, 1995. Visited Christian Albrechts University, Kiel, Germany.
- (53) May 26-June 1, 1995. Visited the University of Zurich, Switzerland.
- (54) June 29-July 1, 1995. Visited Christian Albrechts University, Kiel, Germany.
- (55) March 23-April 2, 1996. Visited Al-Akawayn University, Ifrane, Morocco.
- (56) April 5-May 3, 1996. Visited Odense University, Odense, DK.
- (57) November 1-3, 1996. Attended the AMS meeting, University of Missouri, MO.
- (58) November 19-21, 2000. Visited San Francisco State University.
- (59) November 18-24, 2001. Visited Uppsala University, Sweden.
- (60) December 2-8, 2001. Attended the Gabor Workshop - 2001, Vienna, Austria.
- (61) November 25-26, 2002. Visited San Francisco State University.
- (62) February 7, 2005. Invited address at the International Conference on Harmonic Analysis and Applications, New Zealand. Title: Applications of Hilbert space frames.
- (63) September 24-30, 2006. Attended the program on the Kadison-Singer Problem at AIM, Palo Alto, CA.
- (64) July 20 - 22, 2013: Attended Ingrid Daubechies' birthday meeting at Duke University.
- (65) July 28 - August 3, 2013: Attended the AIM conference in Palo Alto, CA on *interactions between frames and geometry*.
- (66) August 10 - 16, 2013: Attended the CIMPA conference in Mar del Platta, Argentina on Applied Harmonic Analysis.
- (67) August 29 - September 1, 2013. Attended the SPIE conference in San Diego, CA.
- (68) October 7 - 12, 2013: Attended the Frames and Bases conference at the University of Bordeaux, France.
- (69) October 12 - 18, 2013: Attended a *Master Course* on the Kadison-Singer Problem at the University of Copenhagen. This consisted of 6 one hour lectures.
- (70) October 18 - 20, 2013: Attended the special session on frames and wavelets at the sectional meeting of the AMS held at Washington University, St. Louis.

After 2006 I began having everyone bring their problems to me. Many refer to me as *the example/algorithm/model making/counterexamples to conjectures guru*. Now I do research for Defense Applications.