

Mohsen Maesumi

Curriculum Vitae 2017

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Notables

- Physics and Mathematic Research: (a) A geometrical proof of the relativistic reflection formula, [Paper](#) (b) An algorithm for calculating the joint spectral radius of a set of matrices. [Paper 1](#), [Paper 2](#).
- Accessibility Research: A set of TeX/PDF-based software initiatives for making effective and accessible STEM courses. Components include: [SUBTEX](#) a subtitling program, and [WeatherMan](#) a dual video system for the deaf; [PreZoomX](#) and [PreZoomT](#) as logic-based zooming and voice-clip inclusion prototypes for the visually impaired.
- Teaching Research: The first flipped math class, 2001-6, [Flipped Course Repository](#)
- Course Quality Enhancement: A [prototype](#) for using Web2.0 and Wikis to orchestrate data gathering from entire university faculty to improve mathematics offerings.



1 Contact Information

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2 Education

- New York University, Courant Institute of Mathematical Sciences
M. Sc., Ph.D. in Applied Mathematics 1982-1990
Dissertation: *Approximate Scale Breaking Nonlinear Elementary Waves for Two-Phase Incompressible Flow in Porous Layered Media.*
Advisors: J. Glimm and W. B. Lindquist.
- Yale University
M. Sc., M. Phil. in Physics 1980-1982
- Princeton University
A.B. in Physics 1977-1980

3 Academic Appointments

Associate Professor, Lamar University, Beaumont, TX 1996-present
Assistant Professor, Lamar University, Beaumont, TX 1991-1995
Visiting Assistant Professor, Tulane University, New Orleans, LA 1989-1991
Lecturer, Fairleigh Dickinson University, Madison, NJ 1988-1989
Adjunct Lecturer, Polytechnic University, Brooklyn, NY 1986-1987
Adjunct Lecturer, City University of New York, New York, NY 1984-1986
Teaching Assistant, New York University, New York, NY 1982-1984
Teaching Assistant, Yale University, Connecticut, NH 1980-1982

4 Research Publications

16. *A conic section approach to the relativistic reflection formula*, [Paper](#).



15. *Optimal norms and the computation of joint spectral radius of matrices*, Linear Algebra Appl. 428 (2008), No. 10, pp 2324-2338. [Link](#).
14. *Construction of Optimal Norms for Semi-Groups of Matrices*, proceedings of the 44th IEEE Conference on Decision and Control, and the European Control Conference 2005, Seville, Spain, December 12-16, 2006, pp 2013-3018.
13. *Joint Spectral Radius and Hölder Regularity of Wavelets*, in Approximation in Mathematics, Proceedings of AMS regional conference, University of Memphis, Memphis, TN, 1997, Computers and Mathematics with Applications, 40 (2000), no. 1, pp 145-155.
12. Calculating the spectral radius of a set of matrices, in Wavelet Analysis and Multiresolution Methods, Proceedings of the Wavelets Analysis Session of AMS, annual central section meeting, UIUC, IL, March 1999, T.-X. He (ed), Lecture Notes in Pure and Applied Math., 212, Marcel Dekker, NY, 2000, pp 252-272.
11. *Calculating Joint Spectral Radius of Matrices and Hölder Regularity of Wavelets*, in Approximation Theory IX, vol 2, Proceedings of the Ninth International Conference on Approximation Theory, C. K. Chui and L. L. Schumaker (eds.), Vanderbilt University Press, Nashville, TN, 1998, pp 205-212.
10. *On construction of a family of smooth nonseparable prewavelets via infinite products of triangularizable matrices*, SIAM J. Matrix Anal. Appl., Vol. 19, No.4, 1998, pp. 1005-1026. [Paper](#).
9. *An efficient lower bound for the generalized spectral radius of a set of matrices*, Linear Algebra Appl. 240 (1996), pp. 1-7. [Paper](#).
8. *Optimum unit ball for joint spectral radius, an example from four-coefficient multiresolution analysis*, in Approximation Theory VIII, Vol 2: Wavelets and Multilevel Approximation Proceedings of the eighth international conference on approximation theory, C. K. Chui and L. L. Schumaker (eds.), World Scientific Publishing, Singapore, 1995, pp. 267-274. [Paper](#).
7. *Spectral radius of sets of matrices*, in Proc. SPIE 2303, Wavelet Applications in Signal and Image Processing II, 579 (October 11, 1994)



6. *A Class of smooth nonseparable N-dimensional scaling functions*, in Proc. SPIE 2303, Wavelet Applications in Signal and Image Processing II, 64 (October 11, 1994)
5. *Parabolic Mirrors, Elliptic and Hyperbolic Lenses*, The American Mathematical Monthly, vol 99, No 6, 1992, pp. 558-560, [Link](#). Referenced by Calculus with Analytic Geometry, Larson, Hostetler, Edwards, [Link](#).
4. *Triple-shock elementary waves in two-phase incompressible flow in porous media*, Proc. of the 1991 International Conference on Theory and Applications of Differential Equations, Pitman Research Notes in Mathematics Series 273, Partial Differential Equations, Joseph Wiener and Jack K. Hale, eds., 1992, pp 116-120.
3. *Symmetry breaking and the interaction of hyperbolic waves*, IMPACT of Computing in Science and Engineering, 3, (1991), pp 305-32. [Paper](#).
2. *The two dimensional interaction of nonlinear hyperbolic waves: examples from phase flow in porous media*, Proceedings of the 1988 International Conference on Theory and Applications of Differential Equations, R. Aftabizadeh, ed., Ohio University Press, Athens, 1989, pp 155-160 (with W.B. Lindquist).
1. *On the simulation of heterogeneous petroleum reservoirs*, Proc. of the 1987 IMA and University of Minnesota Symposium on Numerical Simulation in Oil recovery, The IMA Volumes in Mathematics and Applications, Numerical Simulation in Oil Recovery, M. F. Wheeler, ed., vol. 11, Springer-Verlag, 1988, pp 89-103 (with P. Daripa, J. Glimm, B. Lindquist and O. McBryan).

5 Notes

1. *The Spotlight Puzzle*, [Note](#).
2. *Accessibility of Mathematical Notations*, [Note](#).

6 Accessibility Research and Prototypes

1. [SUBTEX](#), A T_EX-based subtitling method for the deaf.



2. [WeatherMan](#), a dual video system for the deaf.
3. [PreZoomX](#), logic-based zooming for the visually impaired (with Don Story [AcroTeX](#)).
[PreZoomT](#), voice clips and logic-based zooming for the visually impaired.
4. [Accessibility of Mathematical Notations](#), preprint.

7 Educational Innovations

- [The First Flipped Course Repository](#). The lectures are delivered online, class time is reserved for presentation by students, moderated by the instructor. Use of technology enables the instructor to conduct a dialog-based instruction. Site includes numerous links to interactive demos and 300 hours of video instruction for 9 courses. 2006-present
- [Curriculum Information Repository](#). Site uses Web2.0 technology and Wikis to asynchronously gather information about mathematics curriculum, from the entire university faculty, and promote quality enhancement activities. 2007-present

8 Thesis Supervision

1. Kingsley Abrokwah, Single-phase flow in layered porous media with applications to oil reservoir simulation. Dec 2015
2. S.M. F. Rabbi, *The design and applications of Runge-Kutta methods for the simulation of planetary orbits*. May 2014
3. Saiful Sumon, *The minimal enclosing circle for a set of random points in R^2* . May 2014
4. D. Yiwen, *The numerical calculation of the joint spectral radius for sets of matrices*. May 1998
5. H. Wu, *The joint spectral radius, (ABD)*. May 1997



9 Grants and Proposals

External Grants

1. *Neutron Computed Tomography*, NSF, Sub-contract from University of Texas at Austin, \$36,000. 1997-1999
2. *Joint spectral radius and the finiteness conjecture*, Texas Higher Education Coordinating Board, Advanced Research Program, THECB/ARP Grant, \$ 47,500. 1995-1997

Internal Lamar University Research Enhancement Grants

1. *Hierarchical Databases*, (Graduate student support) \$4,500. 1999-2000
2. *Applications of wavelets in image enhancement*, \$5,000. 1998-1999
3. *Mathematical issues of image enhancement*, \$4,900. 1997-1998
4. *Toward a theory of multi-matrices*, \$4,960. 1996-1997
5. *Mathematical issues in wavelet image analysis*, \$4,950. 1995-1996
6. *Eigenvalue containment in wavelet matrix products*, \$4,940. 1993-1994
7. *The design of a perfect lens*, \$5,000. 1992-1993

Sponsored Students

1. Graduate level: Cynthia Collier, D. Yiwen, H. Wu, Y. Fang, Y. Huang, M. Ba-abbad, A. Hoseini, Y. Shen, Shannon Chen.
2. Undergraduate level: Susan Gregory, J. Jacobovic, K. Perkins, Nasiha Hrustemovic, J. Preston, T. Muharamovic, S. Sinanovic, Nancy Grear, N. Osmanovic, Kandle Culish.



Proposals written since 1998

1. Enhancing Undergraduate Student Learning via Smartphone Apps, NSF-IIS, July 2016, \$1.04M. Co-PI.
2. Computer-Aided Tutoring-Anchored Peer-Urged Linear algebra Tract (CATAPULT). NSF-DUE-TUES, May 2012, \$200K. PI.
3. Enhancing Learning by Integrating Technology into the students' Environment (ELITE). NSF-DUE-TUES, May 2011, \$200K. PI.
4. Cyber-based University Mathematics Courses for the Hearing Impaired. NSF-DUE-TUES, Jan 2010, \$1.3M. PI.
5. Cyber-based High School Mathematics Courses for the Hearing Impaired. NSF-DRL-TUES, Jan 2010, \$1.3M. PI.
6. The content provider as the taxonomist, a new approach to information collection, classification and retrieval for the scientific disciplines. NSF-IIS, Jan 2001, \$500K. PI.
7. Analysis and Applications of Semi-groups of Matrices. NSF-DMS, Jan 2001, \$160K. PI.
8. Analysis and applications of semi-groups of matrices. NSF-DMS, Oct 1999, \$90K. PI.
9. Calculating the Spectral Radius of Iterated Function Systems. NSF-DMS, Dec 1998, \$90K. PI.

10 Advocacies and Community Service

- Advocated Online Master of Math Education at Lamar University for local area teachers. Conducted a survey in Texas Education Agency, Region V.
- Advocated Online Dual Credit Math Program to offer courses to high school students in accordance with the “College Readiness Legislation Initiative of 2006, Texas Education Code, TEC 28.009”.



- Coach for MathCounts.org and AMC.MAA.org at Harmony Science Academy, Beaumont, TX. Conducted math problem solving sessions for middle and high school students. 2008-2011
- Science Fair Judge, Harmony Science Academy. 2006-2010

11 Professional Experience

1. Consultant for a legal case in charge of numerically extracting data from a partially destroyed train block box. 1999-2000
2. Consultant in a legal case in charge of numerically reconstructing an accident scene. 1998-1999
3. Consultant for a Numerical Analysis-Statistics project, University of Connecticut, Storrs, Generated a table of confidence intervals for a multi-variate F -distribution by developing an efficient integration algorithm for high dimensions. 1987-1988
4. Consultant at Refco Capital Holdings, New York, NY. Developed a theoretical framework and a numerical procedure for foreign exchange options. 1986-1987
5. Research member of an experimental high energy physics team at Yale University. Designed a capacitor for use in streamer chamber particle detector. Independently developed a numerical algorithm, based on physical principals, that is equivalent to using boundary integral method and Gauss-Seidel relaxation technique for solving the Laplacian equation. 1981-1982

