

# Professor Josef Sifuentes

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## EDUCATION

- PhD, Rice University, 2010  
Major: Computational and Applied Mathematics
- MA, Rice University, 2006  
Major: Computational and Applied Mathematics
- BA, Rice University, 2004  
Major: Visual Arts, Mathematics, Computational and Applied Mathematics

## EMPLOYMENT

- Co-Director , UTRGV NSF-LSAMP Summer Research Academy (June 2018)
- Assistant Professor, School of Mathematical and Statistical Sciences, University of Texas Rio Grande Valley (September 2015)
- Visiting Assistant Professor, Department of Mathematics, Texas A&M University College Station (September 1, 2012 - August 31, 2015)
- Research Scientist, Courant Institute of Mathematical Sciences, New York University (September 1, 2010 - August 31, 2012)

## PUBLICATIONS

### Journal Articles

- Josef Sifuentes and Shari Moskow. Preconditioning Methods for Thin Scattering Structures Based on Asymptotic Results. *SIAM Journal on Scientific Computing*. 40, no. 4 (July (3rd Quarter/Summer) 2018): B1007–B1019. <https://doi.org/10.1137/17M1132859>
- Josef Sifuentes, Zydrunas Gimbutas, and Leslie Greengard. Randomized methods for rank-deficient linear systems. *Electronic Transactions on Numerical Analysis*. 44, (February 2015): 177-188. [etna.math.kent.edu/volumes/2011-2020/vol44/abstract.php?vol=44&pages=177-188](http://etna.math.kent.edu/volumes/2011-2020/vol44/abstract.php?vol=44&pages=177-188)
- Josef Sifuentes, Mark Embree, and Ronald Morgan. The stability of GMRES convergence, with application to preconditioning by approximate deflation.. *SIAM Journal of Matrix Analysis and Applications*. 34, no. 3 (July (3rd Quarter/Summer) 2013): 1066-1088.

Josef Sifuentes, Mark Embree, Soodholter Kirk, Daniel Szyld, and Fei Xue. Short-term recurrence Krylov subspace methods for nearly-Hermitian matrices.. *SIAM Journal of Matrix Analysis and Applications*. 33, no. 2 (June 2012): 480-500.

Josef Sifuentes, Zydrunas Gimbutas, and Leslie Greengard. Optimized quadratures for the Sommerfeld representation of acoustic and electromagnetic fields..

Josef Sifuentes, Gilbert Ymbert, and Mark Embree. Approximate Murphy-Golub-Wathen preconditioning for saddle point problems..

Josef Sifuentes, Mrinal Kanti Roychowdhury, and Santanu Chakraborty. High precision numerical computation of principal points for univariate distributions. *Communications in Mathematical Sciences*.

### **Periodicals**

Josef Sifuentes. Heavy Metal - Combining Art and Mathematics. *Mathematical Science and Research Institute Emissary*. (October (4th Quarter/Autumn) 2003)  
[www.msri.org/ext/Emissary/EmissaryFall03.pdf](http://www.msri.org/ext/Emissary/EmissaryFall03.pdf)

### **Other**

Josef Sifuentes. Preconditioned Iterative Methods for Inhomogeneous Acoustic Scattering Applications. (May 2010)

### **Under Submission**

### **Journal Articles**

Josef Sifuentes, Mrinal Kanti Roychowdhury, and Santanu Chakraborty. High precision numerical computation of principal points for univariate distributions. *Communications in Mathematical Sciences*.

### **AWARDS AND HONORS**

Sloan Scholars Seed Grant Honorable Mention, Alfred P. Sloan Foundation (August 28, 2018)

National Science Foundation Graduate Research Fellowship, National Science Foundation (September 1, 2006)

### **PRESENTATIONS**

Santanu Chakraborty, Mrinal Kanti Roychowdhury, and Josef Sifuentes. "High Precision Numerical Computation of Principal Points for Univariate Distributions," AMS Sectional Meeting , American Mathematical Society, Nashville, Tennessee. (April 14, 2018)

Josef Sifuentes. "High precision numerical computation of principal points for univariate distributions," Statistics and Probability Seminar, UTRGV SMSS, UTRGV. (March 23, 2018)

Josef Sifuentes. "High precision numerical computation of principal points for univariate distributions," AMS - Fall Southeastern Sectional Meeting, American Mathematical Society, University of Central Florida - Orlando, Florida. (September 23, 2017)

Josef Sifuentes, Gilbert Ymbert, and Mark Embree. "Approximate Murphy-Golub-Wathen Preconditioning For Saddle Point Problems.." Householder Symposium on Numerical Linear Algebra, Blacksburg, VA. (June 2017)

Josef Sifuentes. "Approximate Murphy-Golub-Wathen Preconditioning For Saddle Point Problems," Visiting Scholars Workshop, SMSS, Edinburg, Texas. (November 19, 2016)

Jean Linhart, Adam Larios, and Josef Sifuentes. "Programming and Problem Solving: Getting Started on the Right Foot," MAA Mathfest, MAA, Columbus Ohio. (August 2016)

Josef Sifuentes, Zydrunas Gimbutas, and Leslie Greengard. "Randomized Methods for Rank-Deficient Linear Systems," SIAM Annual Meeting, SIAM, Boston, MA. (July 2016)

Josef Sifuentes. "Krylov Subspaces: Results and Open Problems," Pure Math Seminar in UTRGV SMSS, SMSS, Edinburg, Texas. (April 8, 2016)

Josef Sifuentes. "Approximate deflation preconditioning for iterative methods," Visiting Scholars Workshop, SMSS, Edinburg, Texas. (November 14, 2015)

Josef Sifuentes. "Approximate Murphy-Golub-Wathen Preconditioning For Saddle Point Problems," Applied Math Seminar of the SMSS, SMSS, Edinburg, Texas. (October 19, 2015)

Josef Sifuentes. "An integral equation approach to modeling acoustic wave scatterings," PDE and Imaging Seminar, SMSS, Edinburg, TX. (October 9, 2015)

Josef Sifuentes, Zydrunas Gimbutas, and Leslie Greengard. "Randomized Methods for Rank-Deficient Linear Systems." Householder Symposium on Numerical Linear Algebra, Spa, Belgium. (June 2014)

Josef Sifuentes, Gilbert Ymbert, and Mark Embree. "Approximate Murphy-Golub-Wathen Preconditioning For Saddle Point Problems.," Workshop on Numerical Linear Algebra and Optimization, University of British Columbia, Vancouver, Canada. (August 2013)

Josef Sifuentes, Gilbert Ymbert, and Mark Embree. "An Approximate Deflation Preconditioning Method Based on Multiple Grids for Wave Scattering Problems," SIAM Annual Meeting, SIAM, San Diego, CA. (July 2013)

Josef Sifuentes, Zydrunas Gimbutas, and Leslie Greengard. "Quadrature Methods for Plane Wave Based FMM," SIAM Computational Science and Engineering Conference, SIAM, Boston, MA. (February 2013)

Josef Sifuentes, Gilbert Ymbert, and Mark Embree. "Approximate Murphy-Golub-Wathen Preconditioning For Saddle Point Problems.," SIAM Annual Conference, SIAM, Minneapolis, MN. (July 2012)

Josef Sifuentes and Mark Embree. "Approximate Deflation Preconditioning Methods for Penetrable Scattering Problems.," SIAM Conference for Applied Linear Algebra, SIAM, Valencia, Spain. (June 2012)

Josef Sifuentes. "Convergence Theory for a Restarted GMRES Method with Approximate Deflation Preconditioning." Householder Symposium on Numerical Linear Algebra, Lake Tahoe, NV. (June 2011)

Josef Sifuentes and Shari Moskow. "Preconditioning the Lippmann-Schwinger Equations For Scattering By Thin Structures," SIAM Annual Meeting, SIAM, San Diego, CA. (June 2008)

Josef Sifuentes. "Preconditioning the Integral Formulation of the Helmholtz Equation via Deflation.," SIAM Texas Student Conference, SIAM, Austin, Texas. (February 2008)

Josef Sifuentes. "GMRES performance in integral equation methods for scattering by inhomogeneous media.," Advances in Computational Scattering, Banff International Research

Station, Banff National Park, Canada. (February 2005)

Josef Sifuentes. "Heavy Metal: Using Computational Fluid Flow Software in the creation of special effects in a video.," Blackwell-Tapia Conference, MSRI UC-Berkeley, Berkeley, California. (November 2002)

Josef Sifuentes. "Heavy Metal: Using Computational Fluid Flow Software in the creation of special effects in a video.," AGEP National Conference, AGEP, Albuquerque, New Mexico. (September 2002)

Josef Sifuentes. "Finite Element Software for solving the Incompressible Navier Stokes Equations.," Rice University Undergraduate Research Symposium, Rice University, Houston, TX. (April 2002)

## **TEACHING**

### **Courses Taught**

College Algebra

Diff Equations

Intro to Math Software

Linear Algebra

Math Project

Mech Engineering Analysis I

Numerical Analysis

Real Analysis I

Thesis I

Thesis II

### **Non-Credit Instruction**

- Workshop, UTRGV Center for Excellence in STEM Education, 12. (November 17, 2015)

### **Directed Student Learning**

Undergraduate Capstone/Senior Project. Lucero Rodriguez, "The Brachistochrone Problem" , School of Mathematical and Statistical Science. (June 2018)

Undergraduate Supervised Research. Kolade Adjibi, "Randomized Krylov Subspace Methods for Computing Eigenpairs" , School of Mathematical and Statistical Science. (June 2018)

Master's Thesis Committee Chair. Jesus Saldana, "Deflated Krylov Subspace Methods" , School of Mathematical and Statistical Science. (January 2018)

Undergraduate Supervised Research. Clarissa Rodriguez, "Randomized Krylov Subspace Methods for Computing Eigenpairs" , School of Mathematical and Statistical Science. (June 1, 2018 - July 31, 2018)

Undergraduate Capstone/Senior Project. Emilio Guerra, "The Crouzeix Conjecture" , School of Mathematical and Statistical Science. (August 28, 2017 - December 5, 2017)

Undergraduate Supervised Research. Arturo Torres, "Investigation into Crouziex's Conjecture" , School of Mathematical and Statistical Science. (June 1, 2017 - August 30, 2017)

Undergraduate Capstone/Senior Project. Stephanie Arroyo, "Developing a GUI/App for teaching the damped spring differential equation" , School of Mathematical and Statistical Science. (January 15, 2017 - May 15, 2017)

Master's Thesis Committee Member. Jose Jesus Galarza, "Coupled Telegraph and SIR Model of Information and Diseases" , School of Mathematical and Statistical Science. (May 1, 2017)

Undergraduate Capstone/Senior Project. Carlos Gallardo, "Mathematical Models in Sports Data and Analytics" , School of Mathematical and Statistical Science. (September 1, 2016 - December 16, 2016)

Undergraduate Capstone/Senior Project. Martin Avalos, "Krylov Subspace Methods for Computing Null Vectors" , School of Mathematical and Statistical Science. (September 1, 2016 - December 16, 2016)

Master's Thesis Committee Member. Pengfei Gu, "Lie symmetry to second-order nonlinear differential equations and its first integrals" , School of Mathematical and Statistical Science. (July 26, 2016)

Master's Thesis Committee Member. Xiaoyan Li, "Lie Symmetry to Nonlinear Oscillator Systems and Applications" , School of Mathematical and Statistical Science. (April 28, 2016)

## **SERVICE**

### **Department Service**

Faculty Mentor, Gulf States Regional Math Alliance Meeting. (January 1, 2018 - February 25, 2018)

Other, Math Colloquium. (October 1, 2017 - November 6, 2017)

Faculty Mentor, Gulf States Regional Math Alliance Meeting. (January 1, 2017 - February 26, 2017)

Committee Member, Workshop for Visiting Scholars on Mathematics and their Applications. (September 1, 2016 - November 19, 2016)

Committee Member, Workshop for Visiting Scholars on Mathematics and their Applications. (September 1, 2015 - November 14, 2015)

### **University Service**

Workshop Organizer, Workshop on Applying for Graduate Fellowships. (April 24, 2018)

Workshop Organizer, Workshop on Applying for Graduate Fellowships. (September 28, 2017)

Workshop Organizer, Workshop on Applying for Graduate Fellowships. (September 27, 2016)

Workshop Organizer, Workshop on Applying to Grad School. (September 8, 2016)

Student Recruiter, UTRGV Discover Event. (February 20, 2016)

Workshop Organizer, Workshop on Applying to Summer Research Programs. (February 11, 2016)

Guest Speaker, Public Lecture on Intersection of Math and Art. (November 19, 2015)

Student Recruiter, Volunteer for HESTEC. (September 1, 2015 - October 5, 2015)

## **Development Activities Attended**

Conference Attendance, "Challenge Based Inquiry Conference," UTRGV Center for Excellence in STEM Education. (April 30, 2016)

## **Professional Service**

Reviewer, Journal Article , SIAM Journal on Scientific Computing (August 2018)

Reviewer, Ad Hoc Reviewer , Tapia Celebration for Diversity in Computing (March 10, 2017 - April 11, 2017)

Workshop Organizer , Society for Industrial and Applied Mathematics , Boston , (January 10, 2016 - July 16, 2016)

Reviewer, Journal Article , Transactions on Mathematical Software (April 19, 2016 - July 8, 2016)

Reviewer, Ad Hoc Reviewer , Tapia Celebration for Diversity in Computing (March 10, 2016 - April 11, 2016)

Reviewer, Journal Article , Numerische Mathematik (September 21, 2015 - December 15, 2015)

## **Professional Memberships**

Society for Industrial and Applied Mathematics (SIAM) (September 2015)

## **Public Service**

- Judge , Regional Science Bowl , Edinburg , (February 4, 2017)