

# Roger John Thelwell

James Madison University  
Department of Mathematics & Statistics  
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- EDUCATION
- ◇ **Colorado State University**, Ft. Collins, CO.  
Ph.D. in Mathematics, 2004.  
Dissertation: *Adjoint approach to parameter identification with application to the Richards Equation*  
M.S. in Mathematics with Specialization in Atmospheric Science, 2002.  
Thesis: *The Nonlinear Balance Equation*
  - ◇ **St. Mary's College of Maryland**, St. Mary's City, MD.  
B.A. - concentration in Mathematics, 1991.
- RESEARCH INTERESTS
- Inverse Problems**, ordinary and partial differential equations, modeling, power series, nonlinear waves, applications of dynamical systems.
- WORK EXPERIENCE
- ◇ **Associate Professor**, James Madison University (2011-Present, Assistant 2007 - 2011 )  
Courses taught: Math of Euclid, Introduction to Calculus, Calculus with Functions I & II, Calculus I, II & III, Linear Algebra and DE, Computers and Algorithms, Methods of Applied Math, Analysis & Dynamics of Differential Equations, Introductory PDE, Advanced ODE, Numerical Analysis, Numerical Analysis for DE.
  - ◇ **Visiting Scholar**, UCSD 2018  
Affiliate of UCSD and Scripps Institute of Oceanography during the term of a one year sabbatical. Research focus was the stability of smoke rings, with application to a recently observed large scale ocean dynamic.
  - ◇ **Visiting Faculty** (post doc), University of Washington (Fall 2004 – SP 2006)  
Research - member of the Focused research group studying Nonlinear, three-dimensional waves in water of arbitrary depth. Work on spectral stability of periodic systems. Teaching - Numerical Analysis, PDE.
  - ◇ **Research Assistant**, Colorado State University (2004)  
Selected as RA in the IGERT funded PRIMES project, a multi-disciplinary project focusing on the successful collaboration of Ecology, Math and Statistics in research. Developed and taught the short course 'A Matlab Primer for Ecologists'.
  - ◇ **Teaching Assistant**, Colorado State University (Fall 1998 – 2004)  
Courses Taught: Introductory courses( College Algebra, Trigonometry, Log and Exponential functions), Math in the Social Sciences, Calculus in the Biosciences, Traditional Calculus, Differential Equations.
  - ◇ **Research Assistant**, Colorado State University (2003)  
Numerical simulation of a coupled heat/fluid flow problem. Math Department, Colorado State University .
  - ◇ **Research Assistant**, Colorado State University (1999)  
Developed and coded numerical methods in Matlab and Fortran to estimate hurricane wind speed for the Department of Atmospheric Science of Colorado State University and CIRA.

- ◇ **Delivery Skipper**, Trinidad, W.I. (1996-1997)  
Sailboat Delivery, responsible for safe passage of vessels to ports including Scarborough, Tobago and Seattle, WA.
- ◇ **Peace Corps Volunteer**, Namibia, Africa (1993-1995)  
Primary: Taught courses in both Math and Physical Science, grade 9 through 12.  
Secondary: Installed Siemens telecom equipment, traced and eliminated collision error.
- ◇ **Telecommunication Liaison**, C-Cubed Corp., Lexington Park, MD. (1991-1993)  
Contractor responsible for installing and maintaining computer systems for the 100+ users of CODE 2400, NESEA (Navy engineering lab). Implemented and administered PC, Apple, Solaris and VMS networks. Involved in research to meet expanding needs.

- PUBLICATIONS
- [7.] James S. Sochacki, Roger Thelwell and Anthony Tongen Forced Differential Equations: Problems to Impact Intuition. *PRIMUS*, 29:6, 527-540, (2019) DOI: 10.1080/10511970.2018.1472159 [link](#)
  - [6.] Anthony Tongen, Roger J. Thelwell, and David Becerra-Alonso. Reinventing the wheel: The chaotic sandwheel. *American Journal of Physics*, 81(2):127–133, 2013. [link](#)
  - [5.] D. Carothers, et. al. Connections between power series methods and automatic differentiation. In Forth et al, editor, *Recent Advances in Algorithmic Differentiation*, volume 87 of *Lecture Notes in Computational Science and Engineering*, pages 175–185. Springer, 2012. [link](#)
  - [4.] R. Thelwell, P. Warne, and D. Warne. Cauchy-Kowalevski and polynomial ordinary differential equations. *Electronic Journal of Differential Equations*, 2012(11):1–8, 2012. [link](#)
  - [3.] J.C. von Fischer, G. Butters, Duchateau P.C., R.J. Thelwell, and R. Siller. In situ measures of methanotroph activity in upland soils: a reaction-diffusion model and field observation of water stress. *Journal of Geophysical Research*, 114, 2009. [link](#)
  - [2.] R. Thelwell, B. Deconinck, and J.D. Carter. Instabilities of the one-dimensional stationary solutions of the cubic nonlinear Schrödinger equation. *Journal of Physics A*, 39:73–84, 2006. [link](#)
  - [1.] P DuChateau, R Thelwell, and G Butters. Analysis of an adjoint problem approach to the identification of an unknown diffusion coefficient. *Inverse Problems*, 20(2):601, 2004. [link](#)

GRANTS

- ◇ **Pending**
  - 2022 \$210,000 Missile Defense Agency SBIR/STTR Collaboration: Parker Sochacki Method, Phase 2 Extension, sub-award: Triton Systems, Inc., Paul Warne (PI); Michael Lam; Stephen K. Lucas; Roger J. Thelwell; Anthony Tongen. In support of a design and implementation of a six degree-of-freedom flight mechanics model as part of Triton Systems Inc. \$700,000 Phase 2 Extension funding.
- ◇ **Funded**
  - 2020 \$1,750 JMU Dave Pruett Faculty Innovation Award. Funding to revise, develop, and transition interactive and dynamic introductory scientific computing materials to a cloud based resource.
  - 2020 \$350,000 Missile Defense Agency SBIR/STTR Collaboration: Parker Sochacki Method, Phase 2, sub-award: Triton Systems, Inc., James S. Sochacki (PI); Stephen K. Lucas; Roger J. Thelwell; Anthony Tongen; Paul Warne. In support of a design and implementation of a six degree-of-freedom flight mechanics model as part of Triton Systems Inc. \$1,000,000 Phase 2 funding.
  - 2019 \$5,000 (+ travel money) MAA PIC Math fellow. PI. Accepted into this program, a problem driven high impact learning opportunity to explore problems gathered directly from industry. Deferred until AY21-22.

- 2018 \$40,000 Missile Defense Agency SBIR/STTR Collaboration: Parker Sochacki Method: Phase 1, sub-award: Triton Systems, Inc., James S. Sochacki (PI); Stephen K. Lucas; Roger J. Thelwell; Anthony Tongen; Paul Warne. April 12- August 21. Supported faculty and students to develop proof of concept of flight mechanics numerical solver as part of Triton Systems Inc. \$100,000 Phase 1 funding.
- 2014 \$5,400 Mathematical Association of America (MAA) Regional Undergraduate Mathematics Conferences (RUMC) program. Grant entitled "SUMS 2014," with Elizabeth Brown. Provided roughly half of conference costs.
- 2013 \$27,500 Mathematical Association of America (MAA) National Research Experience for Undergraduates Program (NREUP). Grant titled "M3: Mentoring for Minorities in Mathematics, Optimal steps: What makes a good leg?" PI. May-June 2013. Supported 4 minority students in REU setting.
- 2009 \$27,500 Mathematical Association of America (MAA) National Research Experience for Undergraduates Program (NREUP). Grant titled "M3: Mentoring for Minorities in Mathematics, Mathematics of Mancala," with Anthony Tongen. May-June 2009. Supported 4 minority students in REU setting.
- 2008 \$4,000 JMU 2008 Innovative Diversity Efforts Award (IDEA) Program. Grant titled "M3: Mentoring for Minorities in Mathematics." with Anthony Tongen. May-June 2009. Supported 1 minority student in REU setting.
- 2008 \$50,000 NSF Scientific Computing Research Environments for the Mathematical Sciences (SCREMS) grant titled "SCREMS-JMU-2008." with Jason Martin(PI), Jim Sochacki, and Dave Pruett. Funded purchase of 24 core shared memory server.
- 2008 \$24,190.50 Mathematical Association of America (MAA) National Research Experience for Undergraduates Program (NREUP) grant titled M3: Mentoring for Minorities in Mathematics, Dynamical Systems and Chaos." Co-PI with Anthony Tongen. May - June, 2008. Supported 4 minority students in REU setting.

◇ **Declined**

- 2018 JMU Faculty Senate mini-grant "A Centennial Scholar in Ancient Greece," PI \$5,000. Application for funding to support one Centennial scholar's study abroad costs.
- 2014 MAA NREUP grant "M3: Mentoring for Minorities in Mathematics, Measurement, Models, and Mimicry," Co-PI with Celes Woodruff. \$ 27,500. Funding to support 4 under-represented minorities. Later funded internally by JMU CSM, but transferred as I was unable to participate.
- 2013 Jeffress grant "Interdisciplinary research: A project based approach" PI with co-PIs Anthony Tongen, Rob Prins, Brian Utter. \$100,000. A project based teaching approach involving industrial applications of dynamical systems.
- 2013 NSF grant "Interdisciplinary research: A project based approach" with Anthony Tongen, Rob Prins (PI), Brian Utter. \$320,000. A collaborative research project involving industrial applications of dynamical systems.
- 2010 DOE grant "A Computational Power Series Laboratory: ComPSLab." with Jim Sochacki(PI), David Bernstein, Stephen Lucas, Anthony Tongen, and Paul Warne. \$500,000. Proposal to develop a computational tool for differential equations.
- 2010 NSF-DMS grant "A Quantitative and Qualitative Analysis of Initial Value Differential Equations using Power Series Methods " with Jim Sochacki(PI), Stephen Lucas, G. Edgar Parker, Anthony Tongen, and Paul Warne. \$500,000. Proposal to develop a computational tool for differential equations
- 2007 JMU Innovative Diversity Efforts Award (IDEA) Program, "M3: Mentoring for Minorities in Mathematics." Co-PI with Anthony Tongen; \$4,000. Funding to support one under-represented minority.

CONFERENCE  $\diamond$  **Organizer**  
& SEMINARS

- SUMS 2021 VIRTUAL Shenandoah Undergraduate Math and Statistics Conference. Co-directed with Dr. Peter Kohn. Approximately 150 registered and 80 attended, (15 [talks](#) , 7 [posters](#) )
- SUMS 2020 VIRTUAL Shenandoah Undergraduate Math and Statistics Conference. Co-directed with Dr. Peter Kohn. Approximately 200 registered and 100 attended, (26 [talks](#) , 6 [posters](#) )
- SUMS 2019 Shenandoah Undergraduate Math and Statistics Conference. Co-directed with Dr. Peter Kohn. Approximately 275 registered and 200 attended, (32 talks, 16 posters)
- SUMS 2018 Shenandoah Undergraduate Math and Statistics Conference. Co-directed with Dr. Peter Kohn. Approximately 270 registered, (32 talks, 11 posters)
- SUMS 2017 Shenandoah Undergraduate Math and Statistics Conference. Co-directed with Dr. Peter Kohn. Approximately 290 registered, (29 talks, 13 posters)
- SUMS 2016 Shenandoah Undergraduate Math and Statistics Conference. Co-directed with Dr. Peter Kohn. Approximately 250 registered, (180 undergraduates, 32 talks, 12 posters)
- SUMS 2015 Shenandoah Undergraduate Math and Statistics Conference. Co-directed with Dr. Elizabeth Brown. Approximately 250 registered, (171 undergraduates, 46 talks, 13 posters)
- SUMS 2014 Shenandoah Undergraduate Math and Statistics Conference. Co-directed with Dr. Elizabeth Brown. (24 talks, 12 posters)
- 2010 AMS special session organizer: “Mathematics and Physical Experiment”: (14 invited talks) January 15-16, MAA/AMS in San Francisco, CA.
- Greenslopes 2004 (Graduate student seminar hosting weekly talks) Colorado State University

$\diamond$  **Talks**

- 2019 CHAOS2019 “A Symbolic Approach to Lyapunov Characteristic Exponents,” June 22, Chania, Crete, Greece
- 2019 EYH JMU “Breaking Pasta” workshop leader. March, Harrisonburg, VA.
- 2018 JMM “Coefficient Recovery in a Quasilinear Parabolic PDE.” January 13 in San Diego, CA
- 2018 JMU math seminar “What I learned on my Educational Leave,” September 17
- 2017 JMM “Taylor Methods in Nonlinear Differential Equations” January 5 in Atlanta, GA
- 2016 JMM “A power series approach to stability and control” January 8 in Seattle, WA
- 2015 EYH JMU “Breaking Pasta” workshop leader. April, Harrisonburg, VA.
- 2015 SEARCDE “A power series approach to stability and control” October 10 Charlotte, NC
- 2015 JMM ”Differential equations through the lens of power series” January 11 San Antonio TX
- 2014 EYH JMU “Breaking Pasta” workshop leader. April, Harrisonburg, VA.
- 2014 JMU math seminar “Power Series and Nonlinear D.E.” December 1, Harrisonburg, VA
- 2014 VMI math seminar “Power Series and Nonlinear D.E.” October 27, Lexington, VA.

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- 2013 EYH JMU “Breaking Pasta” workshop leader. April, Harrisonburg, VA.
- 2013 AMS/MAA national meeting. “Power Series, Automatic Differential equations” January 10 San Diego, CA.
- 2012 AD2012 “Power Series and Automatic Differentiation” July 26 Fort Collins, CO
- 2012 AMS/MAA national meeting. “Reinventing the Wheel: The Chaotic Sandwheel” (A. Tongen presented) January 7 Boston MA.
- 2011 CHAOS2011 “The Chaotic Sandwheel” June 6, Agios Nikolaos, Crete, GR.
- 2011 JMU IVS Colloquia “Mathematics: A Visual Feast”. April 13, Harrisonburg, VA.
- 2011 EYH JMU “Breaking Pasta” workshop leader. April, Harrisonburg, VA.
- 2011 AMS/MAA national meeting “Cauchy Kowalevski and Polynomial ODE” January 8, New Orleans, LA
- 2010 Material Workshop - led a 4 hour experiential workshop for 10 students with behavioral issues while in Antigua, W.I.
- 2010 JMU Math seminar “Greece: Odyssey of Discovery”. October 4, Harrisonburg, VA.
- 2010 SEARCDE “Cauchy Kowalevski and Polynomial ODE” October 1, Blacksburg, VA.
- 2010 EYH JMU “Breaking Pasta” workshop leader. April 24, Harrisonburg, VA.
- 2010 AMS/MAA national meeting. “Reinventing the wheel” Special session on Math and Physical experiment. January 15, San Francisco, CA.
- 2009 EYH JMU “Breaking Pasta” workshop leader. April 25, Harrisonburg, VA.
- 2008 AMS/MAA regional meeting. “Wheel of Time, in Sand”, Nov 8, Frederick MD.
- 2008 AMS/MAA joint meeting, “Methane activity in soils,” AMS session on PDE. January 6, San Diego, CA.
- 2006 SU math seminar “2D wave patterns,” Seattle, WA
- 2006 Hamline seminar “Stability (thanks to Fourier and Floquet),” Saint Paul, MN Feb 21
- 2006 Cal State seminar “Adjoint methods and parameter recovery,” Fullerton, CA Feb 12
- 2006 JMU math seminar “Parameter identification via adjoint methods,” Harrisonburg, VA Feb 6
- 2006 Gettysburg math seminar “A smorgasbord of inverse problems,” Gettysburg, PA Feb 2
- 2006 AMS Spring Central Sectional, Notre Dame, IN ”Stability analysis via Hill’s method” Notre Dame, IN. April 8-9
- 2005 AMS Fall Western sectional “An adjoint approach to parameter recovery in a quasilinear parabolic PDE” Special Session on PDE with Application in Eugene, OR Nov. 11–13
- 2005 IMACS “The stability of 1-D nontrivial-phase solutions of the 2-D NLS equation” Nonlinear Evolution Equations and Wave Phenomena, Athens, GA April 11–14
- 2005 ND Applied Math Seminar “Stability of 1-D nontrivial-phase solutions to the 2-D NLS equation” Notre Dame, IN
- 2005 UW Inverse Problem Seminar “Integral based approach to parameter estimations,” Seattle WA
- 2004 Industrial Math Conference “Inverse Problems”, Tempe, AZ

- 2004 CSU Applied Math Seminar “Adjoint methods and parameter recovery,” Colorado State University
- 2003 CSU Grad student seminar “Navigation on Riemannian surfaces,” Colorado State University
- 2002 Industrial Math Conference “Coefficient Identification,” Utah State, UT
- 2002 CSU Applied Math Seminar “General Inverse Problems” Colorado State University
- 2001 CSU Grad student seminar “Nonlinear balance equation” Colorado State University
- 2000 CSU Grad student seminar “Nonlinear dynamics,” Colorado State University

◇ **Posters**

- 2010 “Mancala” James Madison University CSM faculty Research and Teaching Symposium. February
- 2009 “Reinventing the Wheel” James Madison University CSM faculty Research and Teaching Symposium. February
- 2008 “Stability Analysis, courtesy of Fourier and Floquet” James Madison University CSM Faculty Research and Teaching Symposium

◇ **Student Publications**

- Jenna Guenther and Morgan Wolf *An Adaptive, Highly Accurate and Efficient, Parker-Sochacki Algorithm for Numerical Solutions to Initial Value Ordinary Differential Equation Systems*. SIAM Undergraduate Research Online. 12. 10. (2019) DOI: 1137/19S019115.  
link

◇ **Student Talks & Posters**

- 2021 JMU “Power Series and (highly!) nonlinear ODE part I” Sara Stinchcomb, Carolyn Vanty, Kevin Rojas, Garrett Moseley, Delaney MacDonald & Keith Cooper James Madison University July 14 at 11 am
- 2021 JMU “Power Series and (highly!) nonlinear ODE part II” Sara Stinchcomb, Carolyn Vanty, Kevin Rojas, Garrett Moseley, Delaney MacDonald & Keith Cooper James Madison University July 14 at 10 am
- 2019 JMM “Adaptive, Highly Accurate and Efficient, Parker-Sochacki Algorithms for Large Scale Dynamical Systems” Jenna Guenther and Morgan Wolf, Baltimore, MD January 19
- 2018 JMU “Adaptive, Highly Accurate and Efficient, Parker-Sochacki Algorithms for Large Scale Dynamical Systems” Jenna Guenther and Morgan Wolf, James Madison University December
- 2018 MAA sectional “Adaptive, Highly Accurate and Efficient, Parker-Sochacki Algorithms for Large Scale Dynamical Systems” Jenna Guenther and Morgan Wolf, University of Mary Washington, November 2018.
- 2018 SUMS conference “Adaptive, Highly Accurate and Efficient, Parker-Sochacki Algorithms for Large Scale Dynamical Systems” Jenna Guenther and Morgan Wolf, James Madison University October 13
- 2013 SUMS conference “Robotic Legged Locomotion - the construction” Luis Parada, Mikias Kindane, Lisha White, and Jojo Yirrah, James Madison University September 29
- 2013 SUMS conference “Robotic Legged Locomotion - the mathematics” Luis Parada, Mikias Kindane, Lisha White, and Jojo Yirrah, James Madison University September 29

- 2010 AMS/MAA national meeting, AMS REU session. “Mathematics of Ayo & Mancala” Reginald Ford. San Francisco, January 13
- 2009 SUMS conference “Ayo & Mancala” Reginald Ford, Juan Carlos Ortega, David Melendez, and Melinda Vegara. James Madison University October 3
- 2009 SUMS conference “Research for Undergraduates,” David Melendez. James Madison University October 3
- 2009 AMS/MAA national meeting. “A Chaotic Day at the Beach” Lianne Loizou and Jan Herbut-Hewell. Washington, DC January 7.
- 2009 MAA/AMS national poster session - “A Chaotic Day at the Beach”, Mike Dankwa. Washington, DC January 7.
- 2008 SUMS conference “A Chaotic Day at the Beach, part I” Jan Herbut-Hewell and Lianne Liozou. James Madison University October 18
- 2008 SUMS conference “A Chaotic Day at the Beach, part II” Mike Dankwa and Juan Carlos Ortega. James Madison University October 18.
- 2008 SUMS conference “A chaotic day at the beach” - **best research poster**. Lianne Liozou, Jan Herbut-Hewell, Juan Carlos Ortega, and Michael Dankwa. James Madison University October 18.

◇ **Attended**

- JMM national meeting, Denver, CO (2020)
- CHAOS2019, Chania, Crete, Greece (2019)
- MAA/AMS national meeting, Baltimore, MD (2019)
- MAA/AMS national meeting, San Diego, CA (2018)
- MAA/AMS national meeting, Atlanta, GA (2017)
- MAA/AMS national meeting, Seattle, WA (2016)
- MAA/AMS national meeting, San Antonio, TX (2015)
- SEARCDE regional meeting, Charlotte, NC (2015)
- MAA/AMS national meeting, Baltimore, MD (2014)
- MAA/AMS national meeting, San Diego, CA (2013)
- MAA/AMS national meeting, Boston, MA (2012)
- CHAOS2011, Agios Nikolaos, Crete, Greece (2011)
- MAA/AMS national meeting, New Orleans, LA (2011)
- SEARCDE regional meeting, Blacksburg, VA (2010)
- MAA/AMS national meeting, San Francisco, CA (2010)
- MAA/AMS national meeting, Washington, DC (2009)
- MAA regional, James Madison University (2008)
- SUMS Session chair, James Madison University (2008)
- SUMS, session chair and poster judge, James Madison University (2007)
- AMS spring sectional South Bend, IN (2006)
- PIMS-MITAC-VIGRE summer graduate school in inverse problems, University of Washington (2005)
- Free Surface Water Waves workshop, Fields Institute, Toronto, CA (2005)
- AMS-MAA-SIAM national meeting Phoenix, AZ (2004)
- Industrial Math conference Tempe, AZ (2004)
- PRIMES Workshop, Ft. Collins, CO (2003)

- Red Raider Math Biology mini-symposium, Lubbock, TX (2003)
- Rocky Mountain Math Biology Conference, Laramie, WY (2003)
- Industrial Math Conference, Colorado State University (2003)
- Preservation of Stability Under Discretization, Colorado State University (2002)
- MAA Regional, Laramie, WY (2001)
- MAA Regional, Ft Collins, CO (2000)
- PRIMES Workshop, Ft. Collins, CO (2003)
- Atmospheric Science Dept seminars, Ft. Collins, CO (1998-2002)
- Math Dept seminars, Ft. Collins, CO (1997-2004)

RESEARCH  
PROJECTS

- ◇ **Active** (collaborators, ‡ denotes student)
  - Acoustic modelling: Wallops Island flame trench (Abby Maltese<sup>‡</sup> & Caroline Lubert, JMU)
  - Stability analysis: a 3+1 dimensional family of vortex loops. (Llewellyn Smith, UCSD)
  - Lyapunov exponents: application of power series to computation of the Lyapunov spectrum. (Shehadeh, JMU)
  - ODE numerics: nonlinear IVODE solution via Automatic Differentiation (Sochacki et al., JMU & Neidinger, Davidson)
  - ODE theory: Gronwall like error estimate for nonlinear IVODE. (Carothers & Warne, JMU)
  - Symbolic computing: perturbation and control via symbolic power series. (Chalishajar, VMI)
- ◇ **Past Projects** (collaborators, ‡ denotes students)
  - Visualizing Math: high speed art (S. McManus<sup>‡</sup>, JMU)
  - Finite Element: *A-posteriori* error estimates for Finite Element. (Eastman, AAU) 2004-06, 2017-18
  - Statistics: Ocular Dominance and Visual Processing (Alexander Holland<sup>‡</sup>, JMU) 2017
  - Visualizing Lyapunov exponents: Application of power series to computation of the Lyapunov spectrum. (C. Kindley<sup>‡</sup> & A. Gordon<sup>‡</sup>, JMU) 2015-16
  - Math Connections Theater (Warne, JMU) 2013-14
  - Sowing Games: Exploring the mathematics of sowing games, including Mancala and Tchuka Ruma. (Taalman, Tongen, (Ford,Ortega, Melendez & Vegara)<sup>‡</sup> JMU) 2010-12
  - Chaotic Sandwheel: Modeling and characterizing dynamics of a chaotic sandwheel. (Tongen, (Liozou, Herburt-Hewell, Juan Carlos Ortega & Michael Dankwa)<sup>‡</sup> JMU). 2008-11
  - Parameter Identification in Richards' Equation: Application of adjoint methods to parameter recovery. (DuChateau & Butters,Colorado State University ) 2002-04.
  - Dynamics: A walking robot. (Sochacki, (Parada, Kindane, White & Yirrah)<sup>‡</sup>, JMU) 2013
  - Robotics: Math/CISAT effort to design and build centipede-like legged robots. (Jim Sochacki, Ron Kander, and Geoff Egekwu JMU) 2012
  - Stability analysis: Analysis of the stability of traveling water waves KP and NLS equation. (Deconinck, University of Washington ) 2004-06
  - Methane Models: Modeling soil methanotrophic activity and LGR methane analysis instrument for *in situ* applications. (von Fischer, Colorado State University ) 2006-13

- Multi-physics modeling projects: Modeled multiphysics systems and conducted numerous numerical experiments. Projects included Conduction-Diffusion systems, Electrical Impedance Tomography, and the Navier-Stokes system. (Advisor: Simon Tavener) 2000-01
- Hurricane wind velocity estimation: Recovery of velocity profile via pressure field measurements. (Advisor: Paul DuChateau) 1999-01

ADVISING -  
**current** &  
PAST

Undergraduate: 9 current and over 50 who have graduated.

VIGRE: Ramesh Narasimhan. Ph.D. Candidate, Applied Math. VIGRE project: proof of concept Matlab toolbox for introductory PDEs. Fall 2005-06 (University of Washington )

PhD: Dr. Hamid Semiyari. Dissertation :“Power series approach to Boundary value Problems.” external advisor from 2010-14 Ph.D. conferred 2015 (UNCC)

COMAP: JMU facilitator (2013-17): team advisor 2013 (Honorable Mention), 2014 (Successful Participant), 2016 (Honorable Mention), 2017 (Successful Participant and Honorable Mention) (James Madison University )

James Madison University Honors Program: Abby Maltese (reader, 2022), Alex Holland (reader, 2017), Connor Kindely (practicum in 2016 and HON343 in 2017), Vicky Kelly (reader, 2016), Jamey Szalay (reader, 2010), Sierra Hahn-Ventrell (honors option 237 FA12), Katie Ford (honors option 236 SP13)

James Madison University Clubs: Mathematics and Statistics (2010 to present), Pi Mu Epsilon (2010-2012, 2019-), Cycling (2014-Present)

TEACHING    ♦ **James Madison University** Harrisonburg, VA: September 2006 - Present

|          |   |               |
|----------|---|---------------|
| MATH 449 | Numerical Analysis for Differential Equations     | (1 section)   |
| MATH 448 | Numerical Analysis                                | (1 section)   |
| MATH 441 | Advanced ordinary differential equations          | (1 section)   |
| MATH 440 | Fourier Series and partial differential equations | (3 sections)  |
| MATH 337 | Methods of Applied Calculus                       | (2 sections)  |
| MATH 248 | Computers and Numerical Algorithms                | (8 sections)  |
| MATH 238 | Linear Algebra and Differential Equations         | (1 section)   |
| MATH 237 | Calculus III                                      | (2 sections)  |
| MATH 236 | Calculus II                                       | (1 section)   |
| MATH 235 | Calculus I  | (7 sections)  |
| MATH 232 | Calculus with Algebra (II)                        | (14 sections) |
| MATH 231 | Calculus with Algebra (I)                         | (3 sections)  |
| MATH 205 | Introduction to Calculus                          | (7 sections)  |
| MATH 103 | Nature of Math: Euclid (study abroad)             | (7 sections)  |
| MATH 103 | Nature of Math: Joy of X                          | (1 section)   |

♦ **University of Washington** , Seattle, WA: Autumn 2004 - 2006

|           |   |              |
|-----------|---|--------------|
| AMATH 403 | Introduction to methods in applied math III   | (2 quarters) |
| AMATH 352 | Applied linear algebra and numerical analysis | (2 quarters) |

♦ **Colorado State University** , Fort Collins, CO: Spring 1999 - Fall 2003

|                 |   |               |
|-----------------|---|---------------|
| Math 340        | Introduction to ordinary differential equations | (3 semesters) |
| Math 340 Honors | Introduction to ordinary differential equations | (1 semester)  |
| Math 161        | Calculus II for engineers                       | (1 semester)  |
| Math 155        | Calculus for biologists                         | (4 semesters) |
| Math 120        | College algebra                                 | (1 semesters) |
| Math 130        | Math in the social science (assistant)          | (1 semester)  |

◇ **Peace Corps** Namibia : 1994-1996

|         |                              |           |
|---------|------------------------------|-----------|
| Std 10  | Maths, Physics and Chemistry | (1 year)  |
| Std 9   | Maths, Physics and Chemistry | (1 year)  |
| Grade 9 | Maths and Physical Science   | (2 years) |

HONORS & AWARDS ◇ **Honors & Awards**

- NSERC PIMS postdoctoral fellow, University of Washington (2005-06)
- PRIMES project RA recipient, Colorado State University (2004)
- Outstanding Teaching Assistant of the Year, Colorado State University Math Department (2003)
- Fast Track to Work Scholarship Recipient, Colorado State University (2000-04)

COMMITTEE WORK - UNIVERSITY, College, & DEPARTMENTAL ◇ **JMU**

- **Applied Math**, member 2007 - present
- **Calculus**, member 2008 - 12
- **Student Activities**, member 2008-17, 2018-19
- **Math Faculty Search**, member 2011
- **Goldwater** candidate selection, member 2012
- **Computers across the Curriculum** member 2012-14
- **Bluff Point**, member 2013
- **Personnel Advisory**, member 2014-2015, 2015-16
- **Applied Math**, Chair, 2015-17
- *Physics Head Search* member 2016
- **Assessment**, member 2018-19
- **Math Major Working Group**, member 2019-2020
- **Data Science Working Group**, member 2019-2020
- **Service Course 103 subgroup**, member 2019- 2020
- *Data Science 4+1*, member 2020

◇ **CSU**

- Math Chair search committee, member, 2003

REVIEW & REFEREE

Book: *Fourier Series* R. Bhatia, SIAM Review, Vol. 48, 2006

Book: *Applied Numerical Analysis* Chapra, for Mc-Graw Hill

Referee for: Computers and mathematics with applications, Electronic Journal Differential Equations, Inverse Problems, Inverse problems in science and engineering, Mathematical methods in the applied sciences, Mathematics.

WORKSHOPS AND SHORT COURSES

◇ **Mean Field Games**, a 2-day AMS short course in Denver, CO (2020)

◇ **Rigorous Numerics in Dynamics**, a 2-day AMS short course in Seattle, WA (2016)

◇ **Listserv**, Cascade, Qualtrics, afternoon courses in 2015 & 2016

◇ **A Dynamical Systems Approach to the Differential Equations Course**, a 2-day MAA mini-course in San Antonio, TX (2015)

◇ **CS 488** (full semester SP14)

SKILLS

◇ **Matlab**, **Femlab**, **Maple**, **Mathematica**, **Windows Office Suite**

◇ **FORTRAN**, **C**, **HTML**

◇ **Unix**, **Linux**, **VMS**

◇ **Listserv**, **Cascade**, **Qualtrics**

Currently learning **SQL**, **Python** and **COMSOL**