Roger John Thelwell

James Madison University
Department of Mathematics & Statistics
MSC 1911, 305 Roop Hall
Harrisonburg, VA 22807
(540) 568-5103
thelwell@math.jmu.edu

PO Box 915
Harrisonburg, VA 22803
(540) 421-8277

EDUCATION

- **Colorado State University** , Ft. Collins, CO.
  Ph.D. in Mathematics, Summer 2004.
  Dissertation: *Adjoint approach to parameter identification with application to the Richards Equation*
  M.S. in Mathematics with Specialization in Atmospheric Science, Spring 2002.
  Thesis: *The Nonlinear Balance Equation*
- **St. Mary's College of Maryland**, St. Mary's City, MD.
  B.A. - concentration in Mathematics, Spring 1991.

RESEARCH INTERESTS

Inverse Problems, ordinary and partial differential equations, modeling, nonlinear waves, applications of dynamical systems.

WORK EXPERIENCE

- **Assistant Professor**, James Madison University (2007 - present)
  Courses taught: Calculus I, Calculus with Functions I & II, Introductory PDE, and Advanced ODE.
  Research: Soil dynamics, parameter estimation, nonlinear dynamics.
- **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 Scarbourgh, 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

J.C. von Fisher, G. Butters, P. DuChateau, R. Thelwell and R. Siller *In situ measures of methanotroph activity in upland soils: A reaction-diffusion model and field observation of water stress*, *J. Geophysical Res.* **114** (2009)

R. Thelwell, B. Deconinck and J.D. Carter *Instabilities of the one-dimensional stationary solutions of the cubic nonlinear Schrödinger equation*, *J. Phys. A: Math. Gen.* **39**(2006) 73-84

P. DuChateau, R. Thelwell and G. Butters *Analysis of an adjoint problem approach to the identification of an unknown diffusion coefficient, Inverse Problems*, **20** (2004) 601-625

Anthony Tongen and Roger Thelwell *Analysis of a chaotic sandwheel*, in prep

Sean Eastman and Roger Thelwell *Understanding the error of linearization: an adjoint approach*, in prep

GRANTS

◇ **Funded**

· $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," CO-PI with Anthony Tongen. May-June 2009. Supported 4 minority students in REU setting.

· $4,000 JMU 2008 Innovative Diversity Efforts Award (IDEA) Program. Grant titled "M3: Mentoring for Minorities in Mathematics." CO-PI with Anthony Tongen. May-June 2009. Supported 1 minority student in REU setting.

· $50,000 NSF Scientific Computing Research Environments for the Mathematical Sciences (SCREMS) grant titled "SCREMS-JMU-2008." CO-PI with Jason Martin(PI), Jim Sochacki, and Dave Pruett. Funded purchase of 24 core shared memory server.

· $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.

◇ **Submitted**

· DOE grant titled "A Computational Power Series Laboratory: `ComPSLab`." CO-PI with Jim Sochacki(PI), David Bernstein, Stephen Lucas, Anthony Tongen, and Paul Warne. $500,000. In review.

· JMU 2007 Innovative Diversity Efforts Award (IDEA) Program, submitted a grant titled "M3: Mentoring for Minorities in Mathematics." CO-PI with Anthony Tongen; $4,000. Declined.

TEACHING

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

MATH 440	Fourier Series and partial differential equations	(2 semesters)
MATH 441	Advanced ordinary differential equations	(1 semester)
MATH 235	Calculus I	(1 semester)
MATH 231	Calculus with Algebra (I)	(2 semesters)
MATH 232	Calculus with Algebra (II)	(2 semesters)

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

AMATH 403	Introduction to methods in applied math III	(1 quarter)
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 semesters)

◇ **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)

ADVISING

◇ **M**. Bechard, R. Ford, W. Henderson, S. Larson, M. Moxey, J. C. Ortega. Undergraduate advisor, James Madison University .

◇ **R**amesh Narasimhan. Ph.D. Candidate, University of Washington Applied Math. VIGRE project: proof of concept Matlab toolbox for introductory PDEs. Fall 2005-2006

REVIEW & REFEREE

Fourier Series R. Bhatia, SIAM Review, Vol. 48, 2006

Applied Numerical Analysis Chapra, for Mc-Graw Hill

Referee for: Inverse Problems, Inverse problems in science and engineering, Mathematical method in the applied sciences.

COMMITTEE WORK

◇ **JMU**

· Calculus, member, 2008 - present

· Applied Math, member, 2007 - present

◇ **CSU**

· Math Chair search committee, member, 2003

CONFERENCE & SEMINARS

◇ **Talks**

· 2009 EYH workshop "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 "2D wave patterns," Seattle University, WA

· 2006 "Stability (thanks to Fourier and Floquet)," Hamline University, MN Feb 21

· 2006 "Adjoint methods and parameter recovery," Cal State Fullerton, Feb 12

· 2006 "Parameter identification via adjoint methods," James Madison University , VA Feb 6

· "A smorgasbord of inverse problems," Gettysburg College, PA Feb 2

· 2006 AMS Spring Central Sectional, Notre Dame, IN "Stability analysis via Hill's method" AMS spring central sectional, Notre Dame, IN. April 8-9

· 2005 "An adjoint approach to parameter recovery in a quasilinear parabolic PDE" AMS Fall Western section meeting, Special Session on Partial Differential Equations with Application in Eugene, OR Nov. 11-13

· 2005 "The stability of 1-D nontrivial-phase solutions of the 2-D NLS equation" IMACS international conference on Nonlinear Evolution Equations and Wave Phenomena in Athens, GA April 11-14

- 2005 “Stability of 1-D nontrivial-phase solutions to the 2-D NLS equation” Applied Math seminar, Notre Dame, IN
- 2005 ”Integral based approach to parameter estimations,” Inverse Problem seminar, University of Washington
- 2004 Industrial Math Conference, Tempe, AZ ”Inverse Problems”
- 2004 ”Adjoint methods and parameter recovery,” Applied Math Seminar, Colorado State University
- 2003 ”Navigation on Reimannian surfaces,” Grad student seminar, Colorado State University
- 2002 ”Coefficient Identification,” Industrial Math Conference, Utah State, UT
- 2002 Colorado State University ”General Inverse Problems” Applied Math Seminar, Colorado State University
- 2001 ”Nonlinear balance equation” Grad student Seminar, Colorado State University
- 2000 ”Nonlinear dynamics,” Grad student seminar, Colorado State University

◇ **Posters**

- 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 Presentations**

- 2009 SUMS conference ”Ayo & Mancala” Reginald Ford, Juan Carlos Ortega, David Melendez, Melinda Vegara. James Madison University October 3
- 2009 AMS/MAA national meeting. ”A Choatic Day at the Beach” Lianne Loizou and Jan Herburt-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 Herburt-Hewell and Lianne Liozou. James Madison University October 18
- 2008 SUMS ”A Chaotic Day at the Beach, part II” Mike Dankwa and Juan Carlos Ortega. James Madison University October 18.
- 2008 SUMS. ”A chaotic day at the beach” - **best research poster**. Lianne Liozou, Jan Herburt-Hewell, Juan Carlos Ortega, and Michael Dankwa. James Madison University October 18.

◇ **Attended**

- 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)
- Greenslopes seminar, Ft. Collins, CO (2004) Organizer
- 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)

HONORS & AWARDS

◇ **Honors & Awards**

- NSERC PIMS postdoctoral fellow, University of Washington (2005-2006)
- 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 (2000-2004)

RESEARCH PROJECTS

◇ **Active**

- Modified Picard group:
  Continuing discussion about modified Power Series (Parker-Sochacki) like methods. (James Madison University)
- Robotics:
  Math/CISAT effort to design and build centipede-like legged robots. (Jim Sochacki, Ron Kander, and Geoff Egekwu James Madison University)
- Methane Model:
  Modeling soil methanotrophic activity and LGR methane analysis instrument for *in situ* applications. (von Fischer, Colorado State University)
- Parameter Identification in Richards' Equation:
  Application of adjoint methods to parameter recovery. (DuChateau & Butters,Colorado State University).
- Chaotic Sandwheel:
  Modeling and characterizing dynamics of a chaotic sandwheel. (Tongen James Madison University)

◇ **Past Projects**

- Stability analysis
  Analysis of the stability of traveling water waves KP and NLS equation. (Deconinck, University of Washington)
- 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.
- Hurricane wind velocity estimation. Advisor: Paul DuChateau
  Recovery of velocity profile via pressure field measurements.
- Signal Processing:
  Processing of gappy satellite temperature data.