

John M. Neuberger May 2004

Department of Mathematics and Statistics
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A. Professional Preparation:

BS. Mathematics, University of North Texas, 1984.
MS. Mathematics, Colorado State University, 1986.
Ph.D. Mathematics, University of North Texas, 1995.

B. Appointments:

Northern Arizona University, Assoc. Prof., Fall 2002 to date.
Northern Arizona University, Assist. Prof., Fall 1997 to Fall 2002.
Mississippi State University, Assist. Prof., 1995-1997.
E-Systems, Garland Division, Software Engineer, 1986-1990.

C. Publications:

1. "A Sign-Changing Solution to a Superlinear Boundary Value Problem", with A. Castro and J. Cossio, Rocky Mnt. J. Math, **27**, no. 4, 1997, p1041-1053.
2. "A Numerical Method for Finding Sign-Changing Solutions of Superlinear Dirichlet Problems", Nonlinear World, **4**, no. 1, 1996, p73-83.
3. "On Multiple Solutions of a Nonlinear Dirichlet Problem", with A. Castro and J. Cossio, Proceedings of the Second World Congress of Nonlinear Analysts, Part 6 (Athens 1996). Nonlinear Anal. **30**, no. 6, 1997, p3657-3662.
4. "A Sign-Changing Solution for a Superlinear Dirichlet Problem with Reaction Term Nonzero at Zero", Nonlinear Analysis. **33**, no. 5, 1998, p427-441.
5. "A Minmax Principle, Index of the Critical Point, and Existence of Sign-Changing Solutions to Elliptic BVPs", with A. Castro and J. Cossio, Elect. J. Diff. DE., **1998**, no. 2, 18 pgs.
6. "A Numerical Investigation of Sign-Changing Solutions to Superlinear Elliptic Equations on Symmetric Domains", with D. Costa, Z. Deng, J. Comput. Appl. Math., **131**, no. 1-2, 2001, p299-319.

7. "Newton's method and Morse index for semilinear elliptic PDE", with J. Swift, *Int. J. Bif. Chaos*, **11**, no. 3, 2001, p801-820.
8. "A Sign-Changing Solution for a Superlinear Dirichlet Problem, II", with A. Castro and P. Drabek, *Proceedings of the Fifth Miss. State Conf on Diff. Eq. and Comp. Sim.*, *EJDE*, **10**, 2003, p101-107.
9. "A Numerical Reduction Method for Investigating Semilinear Elliptic PDE", with J. Cossio and S. Lee, *Proceedings of the Second World Congress of Nonlinear Analysts*, (Catania, 2000). *Nonlinear Anal.*, **47**, p3379-3390.
10. "Numerical Solutions to a Vector Ginzburg-Landau Equation with a Triple-Well Potential", with D. Rice and J. Swift, *Int. J. Bif. Chaos*, **13**, no. 11, 2003, p3295-3306.
11. "GNGA: Recent Progress and Open Problems for Semilinear Elliptic PDE", To Appear: *AMS J. Contemp. Math*, *Proceedings of Variational Methods: Open Problems, Recent Progress, and Numerical Algorithms* (Flagstaff 2002).
 - (a) "Computing Eigenfunctions on the Koch Snowflake: A New Grid and Symmetry", with N. Sieben and J. Swift, submitted 2003.
 - (b) "Elliptic Partial Difference Equations on Graphs", submitted 2003.

D. Synergistic Activities:

Undergraduate and Graduate students are involved at all levels of the PI's research. The PI has had 19 M.S. Thesis, Independent Study, NSF and locally funded, and REU students. Three have been female, one hispanic. Two have published jointly with the PI, and 3 more are in the process of writing articles for submission. In the PI's Numerical Analysis courses, students progress to the point where they are coding PDE solvers and graphing bifurcation diagrams. The PI encourages his students to make conjectures, often threatening to publish their results jointly. Many undergraduates have done final projects with the PI. Students are involved with writing parallel processing code for eigenfunction generation and nonlinear solvers. The PI has had 5 REU students.

E. Collaborators and Other Affiliations:

Collaborators:

Alfonso Castro, University of Texas at San Antonio.
Jorge Cossio, Universidad Nacional de Colombia, Medellin, Colombia.
David Costa, University of Nevada - Las Vegas.
Zhonghai Ding, University of Nevada - Las Vegas.
Pavel Drabek, University of West Bohemia, Czech Rep.
Sheldon Lee, Winona College.
Dennis Rice, Arizona State University.
Nandor Sieben, Northern Arizona University.
Nikolay Sirakov, Northern Arizona University.
James Swift, Northern Arizona University.

Advisors:

Alfonso Castro, PhD Advisor, Harvey Mudd College.
Paul DuChateau, M.S. Advisor, Colorado State University.

(M.S.) Thesis Advisees:

Jeff Crabill, Everett College; Michael Butros, Victor Valley Community College; Sheldon Lee, Winona College (Joint Paper); Dennis Rice, Arizona State University (Joint Paper); Jay Hineman and Julie Baca, NAU (Joint Papers in Progress); Ty Thompson and Phillip Martinez, NAU (Projects Just Starting).

F. Grants:

1. Received 2 internal NAU "Organized Research" summer grants, 1999 and 2000.
2. PI for \$85,000 NSF-DMS Computational Mathematics award, 2001-2003.
3. PI in continuation proposal, submitted to NSF-DMS Computational Mathematics, with N. Sieben (2003), pending.
4. CO-PI in an interdisciplinary NSF proposal in Groundwater Modeling, with A. Springer and I. Knowles (2004), pending.
5. PI and CO-PI for two proposals submitted to Educational Advancement Foundation for course development (2004), pending.

G. Other:

Organized conference *Variational Methods: Open Problems, Recent Progress, and Numerical Algorithms*, Flagstaff, AZ, Summer 2002. Edited proceedings, accepted by the AMS J. of Contemp. Math., 2004.