Michael Joseph Neilan

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Contact Information

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Education

Ph.D. in Mathematics	The University of Tennessee, May 2009 Advisor: Xiaobing Feng Dissertation: Numerical Methods for Fully Nonlinear Second Order Partial Differential Equations
B.S. in Mathematics and Computer Science	The University of Tennessee, December 2004

Research Interests

- Numerical analysis • Numerical solutions to PDEs • Finite element methods • Nonlinear PDEs
- Discontinuous Galerkin methods • Adaptive finite element methods • Singular perturbation problems
- Numerical methods for high order PDEs • Optimal transport/Monge-Kantorovich problems

Professional Experience

• Assistant Professor	University of Pittsburgh, start date: September 2011 Department of Mathematics
• NSF Postdoctoral Research Fellow	Louisiana State University, 2009–2011 Center for Computation & Technology and Department of Mathematics Supported by NSF grant DMS-0902683
• Graduate Research Assistant	University of Tennessee, 2006–2009 Department of Mathematics Supported by NSF grant DMS-0410266
• Graduate Teaching Associate	University of Tennessee, 2005–2008 Department of Mathematics

Fellowships and Awards

- NSF Mathematical Sciences Postdoctoral Research Fellowship, 2009–2011
- Yates Dissertation Fellowship, 2008–2009
- UTK Mathematics Graduate Student Achievement Award, 2007, 2009
- UTK Graduate Travel Award, SIAM Annual Meeting, 2008
- UTK Science Alliance Fellowship, 2005–2009
- Who's Who in Science and Engineering, 2010

Publications

Refereed Journal Publications

1. X. Feng, M. Neilan, and A. Prohl, *Error analysis of finite element approximations of the inverse mean curvature flow arising from general relativity*, Numerische Mathematik, 108(1):93–119, 2007.

2. X. Feng and M. Neilan, *Vanishing moment method and moment solutions for second order fully nonlinear partial differential equations*, Journal of Scientific Computing, 38(1):74–98, 2009.

3. X. Feng and M. Neilan, *Error analysis for mixed finite element approximations of the fully nonlinear Monge-Ampère equation based on the vanishing moment method*, SIAM Journal on Numerical Analysis, 47(2):1226–1250, 2009.

4. X. Feng and M. Neilan, *A modified characteristic finite element method for a fully nonlinear formulation of the semigeostrophic flow equations*, SIAM Journal on Numerical Analysis, 47(4):2952–2981, 2009.

5. M. Neilan, *A nonconforming Morley finite element method for the Monge-Ampère equation*, Numerische Mathematik, 115(3):371–394, 2010.

6. X. Feng and M. Neilan, *Finite element methods for a bi-wave equation modeling d-wave superconductors*, Journal of Computational Mathematics, 28(3):331–353, 2010.

7. X. Feng and M. Neilan, *Nonconforming finite element and discontinuous Galerkin methods for a bi-wave equation modeling d-wave superconductors*, Mathematics of Computation, 80:1303–1333, 2011.

8. T. Gudi and M. Neilan, *An interior penalty method for a sixth order elliptic equation*, IMA Journal of Numerical Analysis, DOI: 10.1093/imanum/DRQ031, 2011.

9. S.C. Brenner, T. Gudi, M. Neilan, and L.-Y. Sung, *C^0 penalty methods for the fully nonlinear Monge-Ampère equation*, Mathematics of Computation, DOI: 10.1090/S0025-5718-2011-02487-7, 2011.

10. X. Feng and M. Neilan, *Error analysis of Galerkin approximations of the fully nonlinear Monge-Ampère equation*, Journal of Scientific Computing, 47:303–327, 2011.

11. S.C. Brenner and M. Neilan, *A C^0 interior penalty method for a fourth order elliptic singular perturbation problem*, SIAM Journal on Numerical Analysis, 49(2):869–892, 2011.

Journal Papers in Review and Preprints

12. X. Feng and M. Neilan, *The vanishing moment method for fully nonlinear second order partial differential equations: formulation, theory, and numerical analysis*, submitted.

13. S.C. Brenner and M. Neilan, *Finite element approximations of the three dimensional Monge-Ampère equation*, in revision.

14. M. Neilan, *A unified analysis of some finite element methods for the Monge-Ampère equation*, submitted.

15. M. Neilan, *Localized pointwise and global L^p estimates for Nitsche's method*, submitted.

16. M. Neilan, *Quadratic finite element approximations of the Monge-Ampère equation*, submitted.

17. X. Feng, R. Glowinski, and M. Neilan, *Recent developments in numerical methods for fully nonlinear second order partial differential equations*, submitted.

18. S.C. Brenner, M. Neilan, and L.-Y. Sung, *Isoparametric C^0 interior penalty methods for plate bending problems*, submitted.

19. J. Guzmán, D. Leykekhman, and M. Neilan, *A family of non-conforming elements and analysis of Nitsche's method for a singularly perturbed biharmonic problem*, submitted.

20. J. Guzmán and M. Neilan, *A family of non-conforming elements for the Brinkman problem*, submitted.

21. S.C. Brenner, M. Neilan, and L.-Y. Sung, *Finite element methods for the equation of prescribed Gauss curvature*, preprint.

Professional Activities and Services

- Reviewer for *SIAM Journal on Numerical Analysis, Journal of Computational Physics, Journal of Mathematical Analysis and Applications, Numerical Functional Analysis and Optimization, Journal of Computational and Applied Mathematics, Mathematics and Computers in Simulation*
- Member of SIAM, 2007–present
- Vice president of The University of Tennessee SIAM student chapter, 2007–2009
- Member of AMS, 2005–present
- COMSOL Multiphysics tutorial workshop, Louisiana State University, 2009
- Speaker in LSU's SIAM Student Chapter Career Day, 2010 & 2011
- Co-organizer of minisymposium titled, *Numerical Methods for High Order Nonlinear Equations* for 2010 SIAM Annual Meeting (co-organized with Susanne Brenner)
- Co-organizer of minisymposium titled, *Numerical Methods for Monge-Ampère Equations and Optimal Transportation* for ICIAM 2011 (co-organized with Adam Oberman)
- Graduate Student Mentor, The University of Tennessee, 2008
- Best Practices in Teaching Certificate Program, The University of Tennessee, 2007

Research Talks and Presentations

- Applied Math Seminar, The University of Tennessee, October 1, 2007.
- Finite Element Circus, Cornell University, October 19, 2007.
- Finite Element Circus and Rodeo, Louisiana State University, March 7, 2008.
- SIAM Annual Meeting, San Diego, CA, July 5, 2008.
- Finite Element Circus, Rensselaer Polytechnic Institute, October 24, 2008.
- Invited speaker in Applied Math Seminar, University of Kentucky, November 6, 2008.
- Invited speaker in special session of the AMS JMM, Wash. D.C., January 6, 2009.
- Finite Element Circus, University of Delaware, April 24, 2009.
- Computational Math Seminar, Louisiana State University, August 25, 2009.
- Finite Element Circus, The University of Tennessee, October 16, 2009.
- AMS Joint Mathematics Meeting, San Francisco, CA, January 10, 2010.
- Invited speaker at University of Pittsburgh Colloquium, January 26, 2010.
- Scientific Computing Around Louisiana, Baton Rouge, LA, February 5, 2010.
- Invited speaker at Northern Illinois University Colloquium, February 12, 2010.
- Finite Element Rodeo, Southern Methodist University, March 5, 2010.
- Invited speaker in special session of SE sectional AMS Meeting, Univ. of Kentucky, March 27, 2010.

- Finite Element Circus, Brown University, May 1, 2010.
- SIAM Annual Meeting, Pittsburgh, PA, July 15, 2010.
- Poster Presentation, IMA Novel Discretizations Workshop, Univ. of Minnesota, November 1, 2010.
- Applied Math Seminar, Louisiana State University, November 15, 2010.
- Invited speaker in special session of AMS JMM, New Orelans, LA, January 6, 2011.
- Scientific Computing Around Louisiana, New Orleans, LA, January 28, 2011.
- Finite Element Rodeo, Texas A&M, February 25, 2011.
- Invited speaker in scientific computing seminar, Brown University, Providence, RI, March 4, 2011.
- Invited speaker in special session of ICIAM, Vancouver, BC, July 18, 2011.
- Special session of ICIAM, Vancouver, BC, July 18, 2011.
- Invited speaker in special session of AMMCS-2011, Waterloo, ON, July 25, 2011.
- Invited speaker in DG Methods for PDEs workshop, Heraklion, Crete, September 26–28, 2011.

Conference and Workshop Participation

- NIMBioS sponsored high performance computing workshop,
  The University of Tennessee, March 17–19, 2009.
- 33rd SIAM Southeastern-Atlantic Section Conference,
  University of South Carolina, April 4–5, 2009.
- CBMS Conference on Adaptive Finite Element Methods for PDEs,
  Texas A&M University, May 17–22, 2009.
- CBMS Conference on The Mathematics of Diffusion,
  Tulane University, May 17–21, 2010.
- Center for Nonlinear Analysis Summer School: New Vistas in Image Processing and PDEs,
  Carnegie Mellon University, June 7–12, 2010.
- IMA Thematic Year on Simulating Our Complex World: Modeling, Computation and Analysis,
  University of Minnesota,
  - October 16–22, 2010
  - October 30–November 5, 2010
  - November 28–December 3, 2010
  - June 6–June 10, 2011
- Finite Element Circus, University of Minnesota, November 5–6, 2010.

Teaching Experience

- Math 1070 - Numerical Analysis, University of Pittsburgh, Fall 2011
- Math 141 - Calculus I, The University of Tennessee, Fall 2008
- Math 119 - College Algebra, The University of Tennessee, Spring 2006
- Math 125 - Basic Calculus, The University of Tennessee, 2005–2007