

JASON S. HOWELL

Assistant Professor
Department of Mathematics
jhowell@clarkson.edu
Citizenship: U.S.A.

Box 5815
Clarkson University
Potsdam, NY 13699-5815
(864) 506-2169

EDUCATION:

- **Ph.D., Mathematical Sciences, Clemson University, Clemson, SC, August 2007.**
Advisors: Vincent J. Ervin and Hyesuk Lee.
Thesis: *Numerical Approximation of Shear-Thinning and Johnson-Segalman Viscoelastic Fluid Flows.*
- **M.S., Mathematical Sciences, Clemson University, Clemson, SC, May 1998.**
Advisor: Shuhong Gao.
Project: *The Index Calculus Algorithm for Discrete Logarithms.*
- **B.S., Mathematics, College of Charleston, Charleston, SC, December 1996.**

RESEARCH INTERESTS:

- **Current Activities:** Numerical Methods for Coupled Multiscale Problems in Fluid/Fluid and Fluid/Structure Interaction; Algorithms for Simulation of Coupled Ocean-Atmosphere Systems; Numerical Analysis of Arterial Blood Flow; Finite Element Methods for Fluids and Structures.
- **General Interests:** Numerical and Computational Analysis; Numerical Solution of Partial Differential Equations; Computational Fluid Dynamics; Finite Element Methods; Saddle Point Problems; Inf-Sup Conditions; Temporal Integration Methods for Systems of Ordinary Differential Equations; Operator-Splitting Methods; Defect Correction Methods; Continuation Methods; Newtonian and Non-Newtonian Fluid Flow; Reaction-Diffusion Equations; Flow in Porous Media; Iterative Linear and Nonlinear Solvers.

ACADEMIC AND PROFESSIONAL POSITIONS:

- **Assistant Professor, Department of Mathematics**
Clarkson University, Potsdam, NY
August 2010 - present.
Faculty Affiliate, Clarkson University Institute for a Sustainable Environment, September 2010 - present.
- **NSF RTG Postdoctoral Associate**
Center for Nonlinear Analysis, Department of Mathematical Sciences
Carnegie Mellon University, Pittsburgh, PA
September 2007 - July 2010.
- **Graduate Research Assistant, Department of Mathematical Sciences**
Clemson University, Clemson, SC
August 2004 - August 2007.
- **Summer Scholar, Institute for Scientific Computing Research**
Lawrence Livermore National Laboratory, Livermore, CA
May 2004 - August 2004, May 2005 - September 2005, May 2006 - June 2006.
- **Visiting Instructor, Department of Mathematical Sciences**
Clemson University, Clemson, SC
August 2002 - August 2003.
- **Research Associate/Database Administrator**
Clemson Apparel Research, Pendleton, SC
May 1999 - August 2002.

- Graduate Teaching Assistant, Department of Mathematical Sciences
Clemson University, Clemson, SC
January 1997 - May 1999, August 2003 - May 2004.

PUBLICATIONS:

Refereed Journal Publications and Proceedings

13. J. S. Howell, H. Lee, and S. Xu. *Finite element approximation of viscoelastic flow in a moving domain*. Submitted to *Internat. J. Numer. Anal. Modeling* (November 2011).
12. J. S. Howell and N. J. Walkington. *Dual-mixed finite element methods for the Navier-Stokes equations*. Submitted to *ESAIM: Mathematical Modelling and Numerical Analysis*, (July 2011).
11. J. M. Connors, J. S. Howell, and W. J. Layton. *Decoupled timestepping methods for fluid-fluid interaction*. In revision for *SIAM J. Numer. Anal.* (January 2011).
10. J. M. Connors and J. S. Howell. *A fluid-fluid interaction method using decoupled subproblems and differing time steps*. To appear *Numer. Methods PDE*, DOI: 10.1002/num.20681 (March 2011).
9. J. S. Howell and N. J. Walkington. *Inf-sup conditions for twofold saddle point problems*. *Numer. Math.* 118(4) 2011, 663–693.
8. J. S. Howell. *Approximation of generalized Stokes problems using dual-mixed finite elements without enrichment*. *Inter. J. Numer. Meth. Fluids* 67(2) 2011, 247–268.
7. J. M. Connors, J. S. Howell, and W. J. Layton. *Partitioned timestepping for a parabolic two domain problem*. *SIAM J. Numer. Anal.* 47(5) 2009, 3526–3549.
6. J. S. Howell. *Dual-mixed finite element approximation of Stokes and nonlinear Stokes problems using trace-free velocity gradients*. *J. Comput. Appl. Math.* 231(2) 2009, 780–792.
5. J. S. Howell. *Computation of viscoelastic fluid flows using continuation methods*. *J. Comput. Appl. Math.* 225(1) 2009, 187–201.
4. V. J. Ervin, J. S. Howell, and I. Stanculescu. *A dual-mixed approximation method for a three-field model of a nonlinear generalized Stokes problem*. *Comput. Meth. Appl. Mech. Engrg.* 197(33–40) 2008, 2886–2900.
3. V. J. Ervin, J. S. Howell, and H. Lee. *A two-parameter defect-correction method for computation of steady-state viscoelastic fluid flow*. *Appl. Math. Comput.* 196(2) 2008, 818–834.
2. S. Gao, J. Howell. *A general polynomial sieve*. *Designs and codes—a memorial tribute to Ed Assmus*. *Des. Codes Cryptogr.* 18 (1999), no. 1-3, 149–157.
1. S. Gao, J. Howell, D. Panario. *Irreducible polynomials of given forms*. *Finite fields: theory, applications, and algorithms* (Waterloo, ON, 1997), 43–54, *Contemp. Math.*, 225, Amer. Math. Soc., Providence, RI, 1999.

Theses and Technical Reports

2. J. S. Howell. *Numerical approximation of shear-thinning and Johnson-Segalman viscoelastic fluid flows*. Ph.D. Thesis, Mathematical Sciences, Clemson University (2007).
1. J. Howell. *The index calculus algorithm for discrete logarithms*. Master's Thesis. Mathematical Sciences, Clemson University (1998).

Articles in Preparation

- J. S. Howell. *Penalty methods and preconditioning strategies for dual-mixed Stokes and generalized Stokes problems*. In preparation.
- B. Cockburn and J. S. Howell. *Hybridization of dual-mixed finite element methods for generalized Stokes problems*. In preparation.
- J. S. Howell. *A posteriori error estimates and adaptive computation of a dual-mixed approximation method for a nonlinear Stokes problem*. In preparation.

COURSES TAUGHT: (As Instructor of Record)**Department of Mathematics, Clarkson University**

<u>COURSE</u>	<u>SEM/YR</u>
MA131 (Calculus I)	F10
MA231 (Calculus III)	S11
MA311 (Abstract Algebra)	F11
MA330 (Advanced Engineering Mathematics)	F11
MA346 (Applied Algebra and Discrete Structures)	S11
MA571 (Numerical Methods for Differential Equations)	S11
MA572 (Finite Element Methods)	F11

Department of Mathematical Sciences, Carnegie Mellon University

<u>COURSE</u>	<u>SEM/YR</u>
21-120 (Differential and Integral Calculus)	S10
21-123 (Calculus of Approximation)	F08
21-126 (Introduction to Mathematical Software)	F08(3)
21-127 (Concepts of Mathematics)	S08
21-236 (Mathematical Studies II)	S09
21-369 (Numerical Methods)	F07, F08(Indep. Study)
21-762 (Finite Element Methods)	F09

Department of Mathematical Sciences, Clemson University

<u>COURSE</u>	<u>SEM/YR</u>
MTHSC 106 (Calculus I)	F97, F98(2)
MTHSC 108 (Calculus II)	S98, S99, F02(2), S03(2), Su03
MTHSC 206 (Multivariate Calculus)	F02, S03, F03
MTHSC 208 (Ordinary Differential Equations)	S04

HONORS, GRANTS, AND AWARDS:

- Clarkson University Office of Accommodative Services RESPECT Award nomination, Fall 2011.
- SIAM Student Travel Grant, February 2007.
- Outstanding Citizenship Award 2006-2007, Department of Mathematical Sciences, Clemson University.
- Outstanding Graduate Student Presentation, Joint Meeting of the MAA Southeastern Section and the SIAM Southeast Atlantic Section, Auburn, AL, March 31 - April 1, 2006.
- Clemson University Graduate Student Government Travel Award, April 2006.
- Outstanding Citizenship Award 2005-2006, Department of Mathematical Sciences, Clemson University.
- Outstanding Service to the Department Award 2003-2004, Department of Mathematical Sciences, Clemson University.
- Graduate Teaching Assistant of the Year 1998-1999, College of Engineering and Science, Clemson University.
- Outstanding Service to the Department Award 1998-1999, Department of Mathematical Sciences, Clemson University.
- Dean's Scholar Fellowship, College of Engineering and Science, Clemson University, 1998-1999.
- Outstanding Master's Student 1997-1998, Department of Mathematical Sciences, Clemson University.
- Graduation honor *Summa Cum Laude*, College of Charleston, 1996.
- Ewa Wojcicka Mathematics Award (Outstanding Mathematics Major) 1995-1996, Department of Mathematics, College of Charleston.

GRANT PROPOSALS:

- NSF Single Investigator Grant, "Numerical Approximation of Non-Newtonian Flows in Elastic Structures with Applications to Hemodynamics," Submitted December 2011, under review.
- NSF Single Investigator Grant, "Accurate Approximation of Newtonian and Non-Newtonian Fluid Stresses Using Dual-Mixed Finite Element Methods," Submitted December 2010, unfunded.
- NSF Single Investigator Grant, "Analysis of Dual-Mixed Finite Element Methods for Nonlinear Problems in Continuum Mechanics," Submitted December 2009, unfunded.

ADVISING ACTIVITIES:

- Ph.D. advisor, Jay Appleton, Department of Mathematics, Clarkson University, 2011-.
- Undergraduate research project leader, Jacob Sheehy, 2011-.
- Undergraduate major advisor (5 students), Department of Mathematics, Clarkson University, 2011-.

SERVICE ACTIVITIES:**Departmental**

- Organizer and speaker, Numerical Analysis Seminar, Clarkson University Department of Mathematics, Fall 2011.
- Member, Undergraduate Committee, Calculus Subcommittee, Mathematics Department, Clarkson University 2010-.
- Speaker, Clarkson University Math Club Seminar, Clarkson University Department of Mathematics Applied Mathematics Seminar, Fall 2010.
- Co-organizer, Center for Nonlinear Analysis Working Group on Recent Advances in Analysis and Approximation of Fluids, Carnegie Mellon University, Fall 2009.
- Speaker, Carnegie Mellon University Department of Mathematical Sciences Undergraduate Colloquium, Fall 2008, Fall 2009.
- Co-organizer, Graduate Student Seminar 2003-2004, Department of Mathematical Sciences, Clemson University.
- Treasurer, Clemson University SIAM Student Chapter 1997-1998.

University

- Faculty Advisor, Clarkson University chapter of Omega Lambda Tau service fraternity 2010-.
- Senator, Graduate Student Government 2006-2007, Clemson University. Member, Finance Committee, Constitution Committee, Parking Review Board.
- Member, organization and examination committees, Clemson Calculus Challenge (high school mathematics competition) 2003, 2004, Clemson University.

Professional

- Reviewer: Advances in Numerical Analysis, Computer Methods in Applied Mechanics and Engineering, International Journal of Computational Fluid Dynamics, Journal of Applied Mathematics, Applied Mathematics and Computation, Numerical Methods for Partial Differential Equations, Journal of Computational and Applied Mathematics, AMS Mathematical Reviews.
- Reviewer: Prentice-Hall (3 calculus textbooks).
- Member, AMS (since 1998), SIAM (since 1997), SIAM Activity Group on Computational Science and Engineering.

Community

- Volunteer, Animal Rescue League of Western Pennsylvania, Pittsburgh, PA, September 2008-June 2010.

- Founder and President, Clemson Card Players Club (student organization at Clemson University, organized fundraising activities for Big Brother/Big Sisters, Anderson County (SC) Humane Society, American Cancer Society, Camp Happy Days), February 2004-June 2006.

PRESENTATIONS:

26. *Dual-mixed finite element methods for the Navier-Stokes equations*, Analysis and PDE Seminar, University of Delaware, Newark, DE, May, 2011.
25. *Dual-mixed finite element methods for the Stokes and Navier-Stokes equations*, Minisymposium on Algorithm Analysis, Design and Computation for Turbulent Flows, SIAM Annual Meeting (AN10), Pittsburgh, PA, July, 2010.
24. *Compatible dual-mixed finite element methods for fluids*, Computational and Applied Mathematics Seminar, University of Pittsburgh, Pittsburgh, PA, March 2010.
23. *Dual-mixed finite element methods for fluids*, Mathematics Colloquium, Clarkson University, Potsdam, NY, February 2010.
22. *Modeling and simulation of problems in fluid dynamics*, Colloquium, The Wilkes Honors College of Florida Atlantic University, Jupiter, FL, January 2010.
21. *Dual-mixed finite element methods for fluids*, Colloquium, Missouri University of Science & Technology, Rolla, MO, January 2010.
20. *Dual-mixed finite element methods for fluids*, Special Guest Lecture, Louisiana State University Center for Computation & Technology, Baton Rouge, LA, January 2010.
19. *Analysis and approximation of coupled fluid/elastic structure models arising in vascular fluid dynamics*, CNA Working Group on Recent Advances in Analysis and Approximation of Fluids, Carnegie Mellon University, Pittsburgh, PA, September 2009.
18. *Inf-sup conditions for twofold saddle point problems*, BCAM Seminar, Basque Center for Applied Mathematics, Derio, Spain, July 2009.
17. *Dual-mixed finite element methods for the steady Stokes problem using Arnold-Winther tensors*, Finite Element Circus, University of Delaware, Newark, DE, April 2009.
16. *Dual-mixed finite element approximation of Stokes and generalized Stokes problems*, SIAM Conference on Computational Science and Engineering, (CSE09), Miami, FL, March 2009.
15. *Low-order finite element approximation of nonlinear generalized Stokes problems*, 10th Copper Mountain Conference on Iterative Methods, Copper, CO, April 2008.
14. *Approximating the stress tensor in nonlinear generalized Stokes problems*, Finite Element Circus and Rodeo, Louisiana State University Center for Computation & Technology, Baton Rouge, LA, March 2008.
13. *Saddle point problems and inf-sup conditions*, US-Chile Workshop: New Developments in Partial Differential Equations II, Universidad de Chile, Santiago, Chile, January 2008.
12. *A brief introduction to viscoelastic fluids*, Center for Nonlinear Analysis Working Group on Complex Fluids and Transport, Carnegie Mellon University, Pittsburgh, PA, October 2007.
11. *Dual-mixed approximation of generalized Stokes problems*, Computational and Applied Mathematics Seminar, University of Pittsburgh, Pittsburgh, PA, September 2007.
10. *Computing viscoelastic fluid flows at high Weissenberg number*, SIAM Conference on Computational Science and Engineering, (CSE07), Costa Mesa, CA, February 2007.
9. *Cost of accuracy for coupled diffusion and reaction systems*, SIAM Conference on Computational Science and Engineering, (CSE07), Costa Mesa, CA, February 2007.
8. *Finite element approximation of partial differential equations using FreeFEM++*, USC SIAM Student Chapter Seminar, Columbia, SC, February 2007.
7. *Defect-correction methods for finite element computations of viscoelastic fluid flow*, AMS-MAA Joint Mathematics Meetings, New Orleans, LA, January 2007.

6. *Computing viscoelastic fluid flows at high Weissenberg number*, South Eastern Atlantic Mathematical Sciences Workshop (Cha-Cha Days), Charleston, SC, October 2006.
5. *Implementation and performance of a two-grid method for nonlinear reaction-diffusion equations*, Ninth Copper Mountain Conference on Iterative Methods, Copper, CO, April 2006.
4. *Iterative defect-correction strategies for viscoelastic fluid flow*, Joint Meeting of the MAA Southeastern Section and the SIAM Southeast Atlantic Section, Auburn, AL, April 2006.
3. *A defect-correction method for viscoelastic fluid flow*, CASC Work In Progress seminar, Center for Applied Scientific Computing, Lawrence Livermore National Laboratory, August 2005.
2. *Applying a defect correction method to viscoelastic fluid flow*, SIAM-Southeastern Atlantic Region Annual Meeting, Charleston, SC, March 2005.
1. *Irreducible polynomials of given forms, \mathbb{F}_{q^4}* - The Fourth International Conference on Finite Fields and Applications, Waterloo, ON, August 1997.