

Ross Ingram

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Citizenship: U.S.

Previous Clearances: DOE L (2009, 2010), DOD Confidential (2002-2006)

Education

PhD Mathematics, University of Pittsburgh (May 2011, projected)

- *Preliminary Exam* (August 2007) Operator Theory, Advanced Calculus
- *Comprehensive Exam* (September 2008) Computational Fluid Dynamics, Mixed Finite Element Methods, Scientific Computing
- *Thesis Overview* (April 2010)
“Approximating Fast, Viscous Flows in Complicated Domains with Applications in Energy and Biological Sciences”
- 3.96 GPA / 4.00

MS Mathematics, College of Charleston (2005)

- 4.00 GPA / 4.00

BS Mathematics, The Pennsylvania State University (2002)

- *Schreyer Honors College*, Honors in Mathematics
- Minors: English, Physics
- 3.91 GPA / 4.00 (high distinction)

Military Experience (Lieutenant, United States Navy)

May 2002 – August 2006

Naval Nuclear Power Training Command (Charleston, SC)

- Instructor Duties Nuclear Physics, Reactor Principles, Reactor Dynamics
- Leadership Responsibilities
 - Class Director* – Led daily affairs 90+ students and managed 6 Officer Advisers
 - Officer Adviser* – Advised 30+ Officer students (daily military, academic affairs)
 - Command Duty Officer* – Supervised 40+-person watch-team (3000+-person command)
 - Senior Mentor* – Trained 8+ Officer instructors (instructional, technical skills)
- Administrative Accomplishments
 - Rewrote 8+ divisional exams (Physics)
 - Led major revision, 200+ page lecture notes (Physics)
 - Led major revision, 200+ page homework book/key (Reactor Dynamics)

Honors, Awards, and Achievements

- Bechtel-Bettis Atomic Laboratory Summer Intern (2009, 2010)
- Andrew Mellon Predoctoral Fellow (University of Pittsburgh, 2009-10)
- Officer Instructor of the Quarter (Naval Nuclear Power Training Command, 2005)
 - Awarded by Commanding Officer, NNPTC
 - Teaching innovations, major curriculum reconstruction
- Master Training Specialist (United States Navy, 2004)
 - Awarded by Commanding Officer, Naval Education and Training
 - Sustained teaching excellence, innovation, and success
- H. Freeman Stecker Award (Penn State, 2002) – academic achievement
- Schreyer Honors College, induction (Penn State, 1999) – academic achievement
- Presidential Scholar Award (Penn State, 1999) – academic achievement

Work History

August 2006 – present

University of Pittsburgh (Pittsburgh, PA)

- Graduate Research Assistant

- *Applications* – energy sciences (pebble bed nuclear reactors, wind energy), biological flows (onset of glaucoma)
- *Fluid Dynamics* – turbulence modeling; porous media flow; magneto-hydrodynamics; Navier-Stokes, Brinkman, Darcy and non-Darcy equations
- *Theory* – numerical methods for ordinary/partial differential equations, scientific computing, numerical analysis, finite element/difference methods, Sobolev spaces, linear/nonlinear solvers, inverse problems with noisy data
- *Scientific Programming* – FE-BE solver, 3D Stokes-flow (C, PETSC), Novel MFMFEM solver, 3D porous media flow (FORTRAN, PETSC)
- Recitation Leader/Grader
 - (Pre)Calculus, Abstract Algebra, Theoretical Mathematics, Scientific Computing
- Math Assistance Center Coordinator
 - Managed scheduling and operation of departmental tutoring center (50 tutors)

April 2009 – July 2009, April 2010 – July 2010

Bettis Atomic Power Laboratory (Pittsburgh, PA)

- Mathematician
 - Nuclear reactor theory (software design, neutron flux-fission product evolution)

May 2002 – August 2006

Nuclear Power School, Naval Nuclear Power Training Command (Charleston, SC)

- Lieutenant, United States Navy
 - Lecturer, project leader, manager, mentor, supervisor

May 2000 – May 2002

Applied Research Laboratory (University Park, PA)

- Honors Research Assistant
 - Object detection (hyperspectral and SONAR imaging)

Publications and Technical Reports

1. Ingram, R and G. Yuksel. Numerical Analysis of a Finite Element, Crank-Nicolson discretization for MHD Flows at Small Magnetic Reynolds Numbers (submitted Intern. Journal of Numerical Analysis and Modeling, Mar. 2010).
2. Ingram, R.. Unconditional Convergence of High-order Extrapolations of the Crank-Nicolson, Finite-Element Method for the Navier-Stokes Equations (in review, Numerische Mathematik, Mar. 2010).
3. Ingram, R.. Finite Element Approximation of Non-solenoidal, Viscous Flows around Porous and Solid Obstacles (accepted in Jul. 2010 for publication *pending minor revisions*, SIAM Journal of Numerical Analysis).
4. Ingram, R., M.F. Wheeler and I. Yotov. 2010. A Multipoint Mixed Finite Element Method on Hexahedra. SIAM J. Numer. Anal. 48(4): 1281-1312.
5. Ingram, R.N., R.L. Tutwiler. 2002. An Adaptive Nonlinear Correlation Algorithm for Object Recognition: Applications in Hyperspectral Image Processing. Technical Report. Applied Research Laboratory, Autonomous Control and Intelligent Systems Division, The Pennsylvania State University: 1-30.
6. Ingram, R.N., A.S. Lewis and R.L Tutwiler. 2004. An Automatic Nonlinear Correlation Approach for Processing of Hyperspectral Images. Intern. J. Remote Sensing. 25 (22): 4981-4998.

Presentations and Workshop

1. Ingram R.. Convergence Analysis of Crank-Nicolson, Finite Element Discretizations of the Navier-Stokes Equations: Avoiding time-step restrictions (presentation). SIAM Annual Meeting. Pittsburgh Convention Center (Jul. 12-16, 2010).
2. Ingram, R.. A Limitation of the Brinkman model for Porous Media Flows (presentation). International Workshop on Fluid Dynamics, University of Waseda in Tokyo, Japan (Mar. 8-16, 2010).
3. Ingram, R.. The Brinkman-Boussinesq model for Natural Convection in Complicated Domains (presentation). Computational Mathematics Seminar, University of Pittsburgh (Nov. 10, 2009).
4. Ingram, R.. The Brinkman Model for Fast, Viscous, and Turbulent Flows in Porous Media (poster). IMA workshop on Flowing Complex Fluids: Rheological Measurements and Constitutive Modeling, Institute of Mathematics and its Applications at the University of Minnesota (Sep. 14-18, 2009).
5. Ingram, R.. Uncoupling Stability and Accuracy in Tikhonov Regularization Parameter Selection (presentation). ICAM Mini-Conference, Virginia Tech University (Feb. 21, 2009).
6. Ingram, R.. Sensitivity Relation in an Iterated Tikhonov Regularization Scheme (presentation). Varga Conference, Kent State University (October 18, 2008).
7. Brain Imaging Workshop, Mathematical Biosciences Institute at the Ohio State University (Jun. 9-13, 2008).

Scientific Computing

- Languages: C++, C, FORTRAN
- Software: MATLAB, FreeFem++, MAPLE, Mathematica, PETSc

References

- William Layton, Professor and Graduate Director
Dept. of Mathematics, University of Pittsburgh
412-624-8375
wjl@pitt.edu
- Giovanni P. Galdi, William Kepler Whiteford Professor
Dept. of Mechanical Engineering, University of Pittsburgh
412-624-9789,
galdi@pitt.edu
- Mike Sussman, Adjunct Professor
Dept. of Mathematics, University of Pittsburgh
sussmanm@math.pitt.edu
- Catalin Trenchea, Assistant Professor
Dept. of Mathematics, University of Pittsburgh
412-624-5681
trenchea@pitt.edu
- Ivan Yotov, Professor and Chair
Dept. of Mathematics, University of Pittsburgh
412-624-8338
yotov@math.pitt.edu

Advanced Technical Coursework**Mathematics**

- Analysis I/III (real analysis, Lebesgue theory, functional analysis)
- Matrices and Linear Operators I/II
- Partial Differential Equations I/II (classical and modern methods)
- Numerical Methods in Scientific Computing I/II
- Numerical Solutions of Partial Differential Equations
- Iterative Methods
- Finite Element Method
- Mixed Finite Element Methods
- Introduction to Continuum Mechanics
- Computational Fluid Dynamics
- Turbulence Theory and Modeling
- Optimal Control Theory

Physics

- Theoretical Mechanics I
- Quantum Mechanics I
- Electro-magnetism I
- Optics

Computing

- Introduction to C++ programming I