Steven P. Hamilton

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CITIZENSHIP United States of America

CLEARANCE DOE Q Clearance

EDUCATION

Emory University — Atlanta, GA
Doctor of Philosophy in Computational Mathematics, May 2011
GPA: 3.92
Dissertation: *Numerical Solution of the k-Eigenvalue Problem*
Advisor: Michele Benzi

Georgia Institute of Technology — Atlanta, GA
Master of Science in Nuclear Engineering, May 2007
GPA: 4.00
Thesis: *A Time-Dependent Slice Balance Method for High-Fidelity Radiation Transport Computations*
Advisor: Cassiano de Oliveira

Georgia Institute of Technology — Atlanta, GA
Bachelor of Science in Nuclear and Radiological Engineering, May 2006
GPA: 4.00

EXPERIENCE

Oak Ridge National Laboratory, 2011–Present — Oak Ridge, TN
Associate R&D Staff, Radiation Transport Group, 2011–2014
R&D Staff, Radiation Transport Group, 2014–2019
Senior R&D Staff, Radiation Transport Group, 2019–2020
Senior R&D Staff, HPC Methods for Nuclear Applications Group, 2020–present

- Develop computational methods, algorithms, and parallel application codes in the Reactor and Nuclear Systems Division for ORNL customers.
- Developer on Denovo (deterministic) and Shift (Monte Carlo) radiation transport codes within the SCALE package.
- Prepare and submit proposals for scientific funding.

Emory University, 2009–2010 — Atlanta, GA
Instructor, Mathematics and Computer Science Department

- Prepared and delivered lectures and performed evaluations for Calculus I (Math 111) and Linear Algebra (Math 221) courses.
- Set grading rubric and assigned grades.

Los Alamos National Laboratory, 2008 — Los Alamos, NM
Research Practicum, Computational Physics (CCS-2)

- Developed and implemented novel algorithms to remedy negative solutions in finite element formulations of the radiation transport equation.

- Developed framework for Krylov subspace acceleration of nonlinear fixup processes.

Oak Ridge National Laboratory, 2006 — Oak Ridge, TN
Intern, Reactor Physics Group
- Assisted in development of 3-D slice-balance radiation transport solver.
- Implemented Krylov eigenvalue solver using the (P)ARPACK software library.

Georgia Institute of Technology, 2004–2005 — Atlanta, GA
Teacher's Assistant, Mathematics Department
- Led recitation sessions for undergraduate students in calculus and differential equations.
- Tutored students in wide range of mathematics courses.

Florida Power and Light, 2004–2005 — Juno Beach, FL
Intern, Reactor Engineering, Summer 2005
Intern, Nuclear Fuels, Summer 2004
- Automated documentation process for special nuclear material inventories.
- Performed statistical analyses concerning neutron absorber degradation in spent fuel pool.
- Developed improved guidelines for storage of spent fuel assemblies based on computational models.

GRANTS

- PI, "Coupled Monte Carlo Neutronics and Fluid Flow Simulation of Small Modular Reactors", *DOE ASCR*, Exascale Computing Project, ≈$3.5M annually, 2016–2023.
- PI, "Full Power Simulation of the Watts Bar Nuclear Reactor using the Shift Monte Carlo Transport Solver," *OLCF Early Science Program*, 125k Summit node-hours, 2019.
- PI, "On the Path to Exascale: Continuous-Energy Monte Carlo Particle Transport on Advanced Computing Architectures," *ORNL LDRD Program*, $500k annually, 2016-2017.
- Co-PI, "MCREX: Using Monte Carlo algorithms to achieve resiliency and performance at scale for linear and non-linear solver applications," *DOE ASCR*, LAB12-742, $300k annually, 2012-2015.

COMPUTER SKILLS

Languages: C/C++, Fortran 90/95, CUDA, MATLAB, Python
Tools: CMake, Git, Mercurial, LaTeX, Doxygen
Programs: MCNP, SCALE, VisIt

AWARDS

- ORNL Significant Event Award, *Significant Improvement in Computational Performance of the VERA Core Simulator to Meet Industry Objectives for Adoption* (2016)
- R&D 100 Award, *Virtual Environment for Reactor Applications* (2016)
- Mathematics and Computation Division Best Paper/Presentation Award, 2016 ANS Winter Meeting
- IDC HPC Innovation Excellence Award (2014)
- Team Research Award, ORNL Awards Night (2014)
- Mathematics and Computation Division Best Paper/Presentation Award, 2011 ANS Winter Meeting

- DOE Computational Science Graduate Fellowship (2007–2011)
- Participant, 1st Gene Golub SIAM Summer School and 2nd International Summer School on Numerical Linear Algebra, Selva di Fasano, Italy (June 2010)
- Georgia Tech DOE/Exelon Fellowship (2006–2007)
- President's Fellowship, Georgia Tech School of Mech. Eng. (2006–2007)
- Woodruff Scholarship, Georgia Tech School of Mech. Eng. (2004–2006)
- Henry Ford II Scholarship (highest GPA in College of Engineering), Georgia Tech College of Engineering (2005)
- National Merit Scholarship (2002–2006)

PROFESSIONAL ACTIVITIES

American Nuclear Society
- Technical Program Chair, Math. & Comp. Division, 2018–present
- Assistant Technical Program Chair, Math. & Comp. Division, 2017–2018
- Executive Committee Member, Math. & Comp. Division, 2014–2017
- Member 2004–present
- Georgia Tech Student Chapter Treasurer, 2005–2006

Society for Industrial and Applied Mathematics (SIAM)
- Member, 2007–2011, 2014–present

JOURNAL ARTICLES

1. M.A. Jessee, et al., "Lattice physics calculations using the embedded self-shielding method in Polaris, Part I: Methods and implementation," *Annals of Nuclear Energy*, **150**, pp. 107830 (2021).
2. P.K. Romano, et al., "A code-agnostic driver application for coupled neutronics and thermal-hydraulic simulations," *Nuclear Science and Engineering*, pp. 1–21 (2020).
3. E.D. Biondo, T.M. Evans, G.G. Davidson, S.P. Hamilton, "Singular value decomposition of adjoint flux distributions for Monte Carlo variance reduction," *Annals of Nuclear Energy*, **141**, pp. 107327 (2020).
4. F.A. Alexander, et al., "Exascale applications: skin in the game," *Philosophical Transactions of the Royal Society A*, **378**, pp. 20190056 (2020).
5. C.T. Kelley, et al., "Mesh independence of the generalized Davidson algorithm," *Journal of Computational Physics*, **409**, pp. 109322 (2020).
6. J.A. Ellis, T.M. Evans, S.P. Hamilton, C.T. Kelley, T.M. Pandya, "Optimization of processor allocation for domain decomposed Monte Carlo calculations," *Parallel Computing*, **87**, pp. 77–86 (2019).
7. S.P Hamilton, T.M. Evans, "Continuous-energy Monte Carlo neutron transport on GPUs in the Shift code," *Annals of Nuclear Energy*, **128**, pp. 236–247 (2019).
8. K.L. Rowland, C.D. Ahrens, S.P. Hamilton, R.N. Slaybaugh, "Assessment of the Lagrange Discrete Ordinates Equations for Three-Dimensional Neutron Transport," *Nuclear Science and Engineering*, **193** (3), pp. 233–252 (2019).
9. E. Biondo, G. Davidson, T. Pandya, S. Hamilton, T. Evans, "Deterministically estimated fission source distributions for Monte Carlo k-eigenvalue problems," *Annals of Nuclear Energy*, **119**, pp. 7–22 (2018).
10. R. Slaybaugh, M. Ramirez-Zweiger, T. Pandya, S. Hamilton, T. Evans, "Eigenvalue Solvers for Modeling Nuclear Reactors on Leadership Class Machines," *Nuclear Science and Engineering*, **190** (1), pp. 31–44 (2018).
11. S.P. Hamilton, S.R. Slattery, T.M. Evans, "Multigroup Monte Carlo on GPUs: Comparison of history- and event-based algorithms," *Annals of Nuclear Energy*, **113**, pp. 506–518 (2018).

12. L. Jin, K. Banerjee, S. Hamilton, G. Davidson, "Improving variance estimation in Monte Carlo eigenvalue simulations," *Annals of Nuclear Energy*, **110**, pp. 692–708 (2017).
13. A. Toth, et al., "Local Improvement Results for Anderson Acceleration with Inaccurate Function Evaluations," *SIAM Journal on Scientific Computing*, **39** (5), S47–S65 (2017).
14. M. Benzi, T. Evans, S. Hamilton, M. Lupo Pasini, and S. Slattery, "Analysis of Monte Carlo Accelerated Iterative Methods for Sparse Linear Systems," *Numerical Linear Algebra with Applications*, **24** (3), e2088 (2017).
15. S. Hamilton, T. Evans, G. Davidson, S. Johnson, T. Pandya, A. Godfrey, "Hot zero power reactor calculations using the Insilico code," *Journal of Computational Physics*, **314**, pp. 700–711 (2016).
16. S. Hamilton, M. Berrill, K. Clarno, R. Pawlowski, A. Toth, C.T. Kelley, T. Evans, B. Philip, "An assessment of coupling algorithms for nuclear reactor core physics simulations," *Journal of Computational Physics*, **311**, pp. 241–257 (2016).
17. T. Pandya, S. Johnson, T. Evans, G. Davidson, S. Hamilton, A. Godfrey, "Implementation, capabilities, and benchmarking of Shift, a massively parallel Monte Carlo radiation transport code," *Journal of Computational Physics*, **308**, pp. 239–272 (2016).
18. B. Philip, et al., "A Parallel Multi-Domain Solution Methodology Applied to Nonlinear Thermal Transport Problems in Nuclear Fuel Pins," *Journal of Computational Physics*, **286**, pp. 143–171 (2015).
19. S. Hamilton, T. Evans, "Efficient Solution of the simplified PN Equations," *Journal of Computational Physics*, **284**, pp. 155–170 (2015).
20. T. Evans, S. Mosher, S. Slattery, S. Hamilton, "A Monte Carlo Synthetic-Acceleration Method for Solving the Thermal Radiation Diffusion Equation," *Journal of Computational Physics*, **258** (1), pp. 338-358 (2014).
21. A. Phillippe, et al., "A Validation Study of Pin Heat Transfer for MOX Fuel Based on the IFA-597 Experiments," *Nuclear Science and Engineering*, **177** (3), pp. 275-290 (2014).
22. A. Phillippe, et al., "A Validation Study of Pin Heat Transfer for UO2 Fuel Based on the IFA-432 Experiments," *Nuclear Science and Engineering*, **178** (2), pp. 172-185 (2014).
23. G. Davidson, T. Evans, J. Jarrell, S. Hamilton, T. Pandya, R. Slaybaugh, "Massively Parallel, Three-Dimensional Transport Solutions for the k-Eigenvalue Problem," *Nuclear Science and Engineering*, **177** (2), pp. 111-125 (2014).
24. S. Hamilton, M. Benzi, E. Haber, "New Multigrid Smoothers for the Oseen Problem," *Numerical Linear Algebra with Applications*, **17**, pp. 557–576 (2010).
25. W. M. Stacey, et al., "Advances in the Subcritical, Gas-Cooled Fast Transmutation Reactor Concept," *Nuclear Technology*, **97** (1), pp. 72-105 (2007).

REFEREED CONFERENCE PROCEEDINGS

1. P. Romano, et al., "Design of a code-agnostic driver application for high-fidelity coupled neutronics and thermal-hydraulics simulations", Proceedings of PHYSOR, Cambridge, UK, Mar 29-Apr 2, 2020.
2. F. Shriver, S. Lee, S. Hamilton, J. Vetter, J. watson, "Enhancing Monte Carlo proxy applications on GPUs," *2019 IEEE/ACM Performance Modeling, Benchmarking and Simulation of High Performance Computer Systems (PMBS)*, Denver, CO, IEEE, pp. 30–40 (2019).
3. F. Shriver, S. Lee, S. Hamilton, J. Watson, J. Vetter, "VEXS, An Open Platform for the Study of Continuous-Energy Cross-Section Lookup Algorithms on

GPUs," *International Conference on Mathematics and Computational Methods applied to Nuclear Science and Engineering (M&C 2019)*, Portland, OR, American Nuclear Society (2019).

4. S. Hamilton, T. Evans, S. Slattery, "Continuous-energy Monte Carlo Neutron Transport on GPUs in Shift," *Trans. Am. Nucl. Soc.*, **118**, pp. 401–403 (2018).
5. B. Collins, S. Hamilton, S. Stimpson, "Use of Generalized Davidson Eigensolver for Coarse Mesh Finite Difference Acceleration," *Proc. M&C 2017 – International Conference on Mathematics & Computational Methods Applied to Nuclear Science & Engineering*, Jeju, Korea, American Nuclear Society (2017).
6. J. Lei, K. Banerjee, S. Hamilton, G. Davidson, "Variance Estimation in Monte Carlo Eigenvalue Simulations Using Spectral Analysis Method," *Trans. Am. Nucl. Soc.*, **116**, pp. 533–535 (2017).
7. S. Hamilton, T. Evans, S. Slattery, "GPU Acceleration of History-Based Multigroup Monte Carlo," *Trans. Am. Nucl. Soc.*, **115**, pp. 527–530 (2016).
8. S. Hamilton, G. Davidson, T. Evans, K. Banerjee, "Accelerated Monte Carlo fission source convergence with fission matrix and kernel density estimators," *Trans. Am. Nucl. Soc.*, **114**, pp. 385–387 (2016).
9. S. Hamilton, T. Evans, "Deterministic Fission Matrix Acceleration of Monte Carlo calculations," *Trans. Am. Nucl. Soc.*, **113**, pp. 649–651 (2015).
10. T. Evans, W. Joubert, S. Hamilton, S. Johnson, J. Turner, G. Davidson, T. Pandya, "Three-dimensional discrete ordinates reactor assembly calculations on GPUs," *Proc. Joint International Conference on Mathematics and Computation (M&C), Supercomputing in Nuclear Applications (SNA) and the Monte Carlo (MC) Method*, Nashville, TN, American Nuclear Society (2015).
11. A. Toth, C.T. Kelley, S. Slattery, S. Hamilton, K. Clarno, R. Pawlowski, "Analysis of Anderson acceleration on a simplified neutronics/thermal hydraulics system," *Proc. Joint International Conference on Mathematics and Computation (M&C), Supercomputing in Nuclear Applications (SNA) and the Monte Carlo (MC) Method*, Nashville, TN, American Nuclear Society (2015).
12. G. Davidson, T. Evans, S. Hamilton, S. Johnson, T. Pandya, "Shift: A parallel Monte Carlo radiation transport package," *Proc. Joint International Conference on Mathematics and Computation (M&C), Supercomputing in Nuclear Applications (SNA) and the Monte Carlo (MC) Method*, Nashville, TN, American Nuclear Society (2015).
13. S. Slattery, S. Hamilton, T. Evans, "A modified moving least square algorithm for solution transfer on a spacer grid surface," *Proc. Joint International Conference on Mathematics and Computation (M&C), Supercomputing in Nuclear Applications (SNA) and the Monte Carlo (MC) Method*, Nashville, TN, American Nuclear Society (2015).
14. S. Hamilton, T. Evans, "A Comparison of Eigensolvers for the SPN Equations," *Trans. Am. Nucl. Soc.*, **111**, pp. 723–724 (2014).
15. J. Gehin, A. Godfrey, T. Evans, S. Hamilton, F. Francheschini, "Watts Bar Unit 1 Cycle 1 Zero Power Physics Tests Analysis with VERA-CS", *Proc. PHYSOR 2014 International Conference* (2014).
16. M. Jessee, et al., "POLARIS: A New Two-Dimensional Lattice Physics Analysis Capability for the SCALE Code System," *Proc. PHYSOR 2014 International Conference* (2014).
17. D. Peplow, Z. Bell, S. Hamilton, "Identification of Leakage Spectra from Neutron Activation in Glass/Cherenkov Detectors," *Proc. of 18th Topical Meeting of the Radiation Protection and Shielding Dividsion of ANS* (2014).
18. S. Hamilton, et al., "Multiphysics Simulations for LWR Analysis," *Proc. International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering* (2013).

19. C. Baker, G. Davidson, T. Evans, S. Hamilton, J. Jarrell, W. Joubert, "High Performance Radiation Transport Simulations on TITAN," *Proc. of SC12: The International Conference for High Performance Computing, Networking, Storage and Analysis* (2012).
20. J. Banfield, S. Hamilton, K. Clarno, G. Maldonado, "A New Semi-Implicit Direct Kinetics Method with Analytical Representation of Delayed Neutrons," *Trans. Am. Nucl. Soc.*, **107**, pp. 1111-1114 (2012).
21. J. Banfield, K. Clarno, S. Hamilton, G. Maldonado, B. Philip, M. Baird, "Benchmarking of Software and Methods for Use in Transient Multidimensional Fuel Performance with Spatial Reactor Kinetics," *Proc. of 2012 International Congress on the Advances in Nuclear Power Plants* (2012).
22. B. Philip, R. Sampath, S. Hamilton, M. Berrill, S. Allu, K. Clarno, "A Parallel Computational Approach to Nuclear Fuel Assembly Simulations," *Trans. Am. Nucl. Soc.*, **106**, pp. 380-383 (2012).
23. K. Clarno, et al., "Integrated Radiation Transport and Thermo-Mechanics Simulation of a PWR Assembly," *Trans. Am. Nucl. Soc.*, **106**, pp. 726-731 (2012).
24. S. Hamilton, K. Clarno, B. Philip, M. Berrill, R. Sampath, S. Allu. Integrated Radiation Transport and Nuclear Fuel Performance for Assembly-Level Simulations. *Proc. PHYSOR 2012: Advanced in Reactor Physics* (2012).
25. S. Hamilton, K. Clarno, "Mathematical Framework for Coupling the AMP and Denovo Codes," *Trans. Am. Nucl. Soc.*, **105**, pp. 515-517 (2011).
26. S. Hamilton, M. Benzi, "A Davidson Method for the k-Eigenvalue Problem," *Trans. Am. Nucl. Soc.*, **105**, pp. 432-434 (2011).
27. S. Hamilton, M. Benzi, J. Warsa. Negative Flux Fixups in Discontinuous Finite Element SN Transport. *Proc. International Conference on Mathematics, Computational Methods and Reactor Physics* (2009).
28. S. Hamilton, K. Clarno, C. de Oliveira, "Error Control in a Time-Dependent Slice-Balance Method," *Trans. Am. Nucl. Soc.*, **97**, pp. 533-535 (2007).
29. S. Chiu, et al., "Fuel Cycle Analysis of a Subcritical Fast, Gas-Cooled Transmutation Reactor," *Trans. Am. Nucl. Soc.*, **95**, pp. 187-188 (2006).
30. K. Clarno, V. de Almeida, E. d'Azevedo, C. de Oliveira, S. Hamilton, "GNES-R: Global Nuclear Energy Simulator for Reactors, Task 1: High-Fidelity Neutron Transport," *Proc. of PHYSOR 2006: Advanced in Nuclear Analysis and Simulation* (2006).

INVITED TALKS

1. S. Hamilton, "ExaSMR: Coupled Monte Carlo Neutronics and Fluid Flow Simulations of Small Modular Reactors," International Conference for High Performance Computing, Networking, Storage, and Analysis (SC19), Denver, CO (2019).
2. S. Hamilton, "Radiation transport algorithmic development using mini-apps," Current Issues in Computational Methods – Roundtable, 2016 American Nuclear Society Annual Meeting, New Orleans, LA (2016).
3. S. Hamilton, "Acceleration of Monte Carlo radiation transport eigenvalue calculations," Georgia Scientific Computing Symposium, Atlanta, GA (2016).

CONTRIBUTED CONFERENCE PROCEEDINGS

1. S. Hamilton, T. Evans, "Coupled Monte Carlo Radiation Trnasport and CFD for Nuclear Reactor Modeling," *2019 SIAM Conference on Computational Science and Engineering*, Spokane, WA (2019).
2. S. Hamilton, T. Evans, S. Slattery, "Experience porting Monte Carlo particle transport to GPUs," *15th Copper Mountain Conference on Iterative Methods*, Copper Mountain, CO (2018).

3. S. Hamilton, T. Evans, S. Slattery, "GPU algorithms for Monte Carlo particle transport," *2017 SIAM Conference on Computational Science and Engineering*, Atlanta, GA (2017).
4. T.M. Pandya, T.M. Evans, S.P. Hamilton, J.A. Ellis, "A fully synchronous domain decomposed transport algorithm with splitting," *2017 SIAM Conference on Computational Science and Engineering*, Atlanta, GA (2017).
5. S. Hamilton, T. Evans, M. Lupo Pasini, M. Benzi, "GPU implementation of a Monte Carlo linear solver algorithm," *14th Copper Mountain Conference on Iterative Methods*, Copper Mountain, CO (2016).
6. M. Ramirez Zweiger, R. Slaybaugh, T. Evans, S. Hamilton, T. Pandya, "Radiation transport using Rayleigh quotient iteration," *14th Copper Mountain Conference on Iterative Methods*, Copper Mountain, CO (2016).
7. R. Pawlowski, S. Hamilton, M. Berrill, K. Clarno, A. Toth, C.T. Kelley, A. Salinger, "Comparing Anderson acceleration to Newton-based solvers on multiphysics systems," *14th Copper Mountain Conference on Iterative Methods*, Copper Mountain, CO (2016).
8. C.T. Kelley, A. Toth, R. Pawlowski, A. Ellis, S. Slattery, S. Hamilton, T. Evans, "Local improvement results for Anderson acceleration and inaccurate function evaluations," *14th Copper Mountain Conference on Iterative Methods*, Copper Mountain, CO (2016).
9. M. Lupo Pasini, M. Benzi, T. Evans, S. Hamilton, S. Slattery, "Monte Carlo acceleration of iterative solvers for eigenvalue problems," *14th Copper Mountain Conference on Iterative Methods*, Copper Mountain, CO (2016).
10. J. Turner, K. Clarno, S. Hamilton, R. Pawlowski, S. Slattery, "Coupled nuclear reactor simulations with the Virtual Environment for Reactor Applications (VERA), 2nd Frontiers in Comp. Phys., Zurich, Switzerland (2015).
11. R. Pawlowski, S. Hamilton, M. Berrill, A. Toth, C.T. Kelley, A. Salinger, "On the performance of Anderson acceleration for multiphysics problems," SIAM Conference on Computational Science and Engineering (CSE15), Salt Lake City, UT (2015).
12. A. Toth, C.T. Kelley, S. Slattery, K. Clarno, R. Pawlowski, "Analysis of Anderson acceleration for coupled neutronic and thermal hydraulic calculations in a light water reactor," SIAM Conference on Computational Science and Engineering (CSE15), Salt Lake City, UT (2015).
13. S. Slattery, S. Hamilton, T. Evans, "Parallel Algorithms for Monte Carlo linear solvers," SIAM Conference on Computational Science and Engineering (CSE15), Salt Lake City, UT (2015).
14. R. Pawlowski, M. Berrill, S. Hamilton, K. Clarno, "An Assessment of Coupling Algorithsm for Parallel Coupled Neutronic and Thermal-Hydraulic Simulations," *12th Copper Mtn. Conference on Iterative Methods*, Copper Mountain, CO (2014).
15. S. Hamilton, T. Evans, S. Slattery, "Multilevel Monte Carlo Solvers for Linear Systems," *12th Copper Mtn. Conference on Iterative Methods*, Copper Mountain, CO (2014).
16. S. Hamilton, T. Evans, S. Slattery, "Monte Carlo Synthetic Acceleration as Approximate Polynomial Preconditioning," *12th Copper Mtn. Conference on Iterative Methods*, Copper Mountain, CO (2014).
17. K. Clarno, M. Berrill, S. Hamilton, R. Pawlowski, "Advanced Coupling Explorations for Parallel Coupled Neutronic and Thermal-Hydraulic Simulation," *16th Conference on Parallel Processing for Scientific Computing*, Portland, OR (2014).
18. S. Hamilton, K. Clarno, B. Philip, M. Berrill, R. Sampath, S. Allu, "Coupled Radiation Transport and Thermomechanics using the AMP and Denovo

Codes," *11th Copper Mtn. Conference on Iterative Methods*, Copper Mountain, CO (2012).

19. B. Philip, et al., "A Jacobian Free Newton Krylov Method with Multilevel Block Preconditioning for Multi-Domain Quasistatic Thermomechanics," *11th Copper Mtn. Conference on Iterative Methods*, Copper Mountain, CO (2012).
20. S. Hamilton, M. Benzi, "Eigensolvers for Radiation Transport Applications," *11th Copper Mountain Conference on Iterative Methods*, Copper Mountain, CO (2010).
21. S. Hamilton, M. Benzi, E. Haber, "New Smoothers for the Oseen Problem," *14th Copper Mtn. Conference on Multigrid Methods*, Copper Mountain, CO (2009).