

SIGAL GOTTLIEB

EDUCATION

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|-------|------|----------------------------------|---|
| Ph.D. | 1998 | Brown University, Providence, RI | Division of Applied Mathematics <i>Advisor: Chi-Wang Shu</i> |
| Sc.M. | 1995 | Brown University, Providence, RI | |
| Sc.B. | 1993 | Brown University, Providence, RI | <i>Magna Cum Laude</i> <i>with Honors in Applied Math</i> |

APPOINTMENTS

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|----------------------|---|--|
| 1/1/2013 - present | Director | Center for Scientific Computing and Visualization Research University of Massachusetts Dartmouth |
| 9/1/2008 - present | Professor | Department of Mathematics |
| 9/1/2004 - 8/31/2008 | Associate Professor | University of Massachusetts Dartmouth |
| 9/1/1999 - 8/31/2004 | Assistant Professor | |
| 9/1/2008 - present | Visiting Professor | Division of Applied Mathematics |
| 8/1/2005 - 8/31/2008 | Visiting Associate Professor | Brown University, Providence, RI |
| 9/1/2002 - 7/30/2005 | Visiting Assistant Professor | <i>(courtesy position)</i> |
| 6/1/1998 - 8/31/2002 | Visiting Postdoctoral Research Associate | Division of Applied Mathematics Brown University, Providence, RI |

SELECTED PUBLICATIONS

- S. Gottlieb, Z. Grant, and D. Higgs, “Optimal Explicit Strong Stability Preserving Runge–Kutta Methods with High Linear Order and optimal Nonlinear Order.” Accepted for publication in *Mathematics of Computation* (2014).
- Y. Chen, S. Gottlieb, and Y. Maday, “Parametric Analytical Preconditioning and its Applications to the Reduced Collocation Methods”. *Comptes Rendus Mathematique* (2014) **352(7-8)**, pp. 661-666.
- K. Cheng, W. Feng, S. Gottlieb, and C. Wang. “A Fourier Pseudospectral Method for the ”Good” Boussinesq Equation with Second Order Temporal Accuracy”. Accepted for publication in *Numerical Methods for Partial Differential Equations* (2014).
- Y. Chen and S. Gottlieb, “Reduced Collocation Methods: Reduced Basis Methods in the Collocation Framework.” *Journal of Scientific Computing* (2012) **55(3)**, pp. 718–737.
- S. Gottlieb, F. Tone, C. Wang, X. Wang, and D. Wirosoetisno, “Long time stability of a classical efficient scheme for two dimensional Navier-Stokes equations.” *SIAM Journal on Numerical Analysis* (2012) **50**, pp. 126-150.
- S. Gottlieb and C. Wang, “Stability and convergence analysis of fully discrete Fourier collocation spectral method for 3-D viscous Burgers equation.” *Journal of Scientific Computing* (2012) **53(1)**, pp. 102-128.

- D.I. Ketcheson, S. Gottlieb, and C. B. Macdonald, “Strong stability preserving two-step Runge-Kutta methods.” *SIAM Journal on Numerical Analysis* (2012) **49**, pp. 2618-2639.
- S. Gottlieb, J.-H. Jung, and S. Kim, “Iterative adaptive RBF methods for detection of edges in two dimensional functions.” *Applied Numerical Mathematics* (2011) **61**(1), pp. 77-91.
- S. Gottlieb, J.-H. Jung, and S. Kim, “A review of David Gottlieb’s work on the resolution of the Gibbs phenomenon” *Communications in Computational Physics* (2011) **9**, pp. 497-519.
- J.-H. Jung, S. Gottlieb, S. O. Kim, C. L. Bresten and D. Higgs, “Recovery of High Order Accuracy in Radial Basis Function Approximations of Discontinuous Problems.” *Journal of Scientific Computing*, (2010) **45**(1-3), pp. 359–381.
- S. Gottlieb, D. Ketcheson, and C.-W. Shu “High Order Strong Stability Preserving Time Discretizations.” *Journal of Scientific Computing* (2009) **38**(3), pp. 251–289.
- J.-H. Jung and S. Gottlieb, “On the Numerical Implementation of spectral Galerkin Penalty Methods.” *Communications in Computational Physics* (2009) **5**(2-4), pp. 600-619.
- D. Ketcheson, C. Macdonald, and S. Gottlieb, “Optimal implicit strong stability preserving Runge-Kutta methods.” *Applied Numerical Mathematics* (2009) **59** (2), pp. 373-392.
- C. Macdonald, S. Gottlieb, and S. J. Ruuth, “A numerical study of diagonally split Runge–Kutta methods for PDEs with discontinuities.” *Journal of Scientific Computing* (2008), **36** (1), pp. 89-112.
- R. Archibald, A. Gelb, S. Gottlieb and J. Ryan, “One-sided post-processing for the Discontinuous Galerkin Method Using ENO-type stencil choice and the Edge Detection Method.” *Journal of Scientific Computing* (2006) **28**, pp.167-190.
- S. Gottlieb, D. Gottlieb and C.-W. Shu, “Recovering High Order Accuracy in WENO Computations of Steady State Hyperbolic Systems” *Journal of Scientific Computing* (2006) **28**, pp.307-318.
- S. Gottlieb and S. J. Ruuth, “Optimal strong-stability-preserving time-stepping schemes with fast downwind spatial discretizations.” *Journal of Scientific Computing* (2006) **27**, pp. 289-304.
- S. Gottlieb, J. S. Mullen and S. J. Ruuth, “A fifth order flux-implicit WENO method.” *Journal of Scientific Computing* (2006) **27**, pp. 271-288.
- S. Gottlieb, “On High Order Strong Stability Preserving Runge-Kutta and Multi Step Time Discretizations.” *Journal of Scientific Computing* (2005) **25** , pp. 105-128.
- D. Gottlieb and S. Gottlieb, “Spectral Methods for Compressible Reactive Flows” *Comptes Rendus Mecanique* (2005) **333**, pp. 3-16.
- S. Gottlieb and L.-A. J. Gottlieb, “ Strong Stability Preserving Properties of Runge–Kutta Time Discretization Methods for Linear Constant Coefficient Operators” *Journal of Scientific Computing* (2003) **18** (1), pp. 89-109.
- S. Gottlieb, C.W. Shu and E. Tadmor, “Strong Stability Preserving High Order Time Discretization Methods.” *SIAM review* (2001) **43** (1), pp. 89-112
- P.F. Fischer and S. Gottlieb, “Solving $Ax = b$ using a modified conjugate gradient method based on the roots of A .” *Journal of Scientific Computing* (2000) **15**(4), pp.441-456.
- S. Gottlieb and C.W. Shu, “Total Variation Diminishing Runge-Kutta Schemes.” *Mathematics of Computation* (1998) **67**, pp.73-85.

- P. F. Fischer and S. Gottlieb “A Modified Conjugate Gradient Method for the Solution of $A\underline{x} = \underline{b}$.”
Journal of Scientific Computing (1998) **13**(2), pp.173-183.
- C.R. Johnson, I.M. Spitkovsky and S. Gottlieb “Inequalities Involving the Numerical Radius.”
Linear and Multilinear Algebra (1994) **37**, pp.13-24.

BOOKS

- Jan S. Hesthaven, Sigal Gottlieb, David Gottlieb *Spectral Methods for Time Dependent Problems*.
Cambridge Monographs on Applied and Computational Mathematics (No. 21) Cambridge
University Press (2006). ISBN 0521792118
- Sigal Gottlieb, David Ketcheson and Chi-Wang Shu *Strong Stability Preserving Runge–Kutta and
Multistep Time Discretizations*. World Scientific Press (2011). ISBN 978-981-4289-26-9

RESEARCH GRANTS

- PI on AFOSR grant FA9550-12-1-0224 “Tailoring High Order Time Discretizations use with spatal
discretizatons of hyperbolic PDEs” May 1, 2012-April 30, 2015 for \$248,636.
- co-PI on KAUST Faculty Initiated Collaboration Grant FIC/3020/05 “Positive Numerical Solution
of Differential Equations”, September 26, 2010- September 25, 2013 for \$202,363.
- PI on AFOSR grant FA9550-09-1-0208 “High Order Strong Stability Preserving Time Discretiza-
tions for the Time Evolution of Hyperbolic Partial Differential Equations” March 2009-
December 2011, for a total of \$148,187.
- PI on AFOSR DURIP grant FA9550-10-1-0354 “A Heterogeneous Terascale Computing Cluster
for the Development of GPU Optimized High Order Numerical Methods.” July 15, 2010-July
14, 2011 for a total of \$199,800.
- co-PI on NSF grant CNS-0959382 “MRI-R2 : Acquisition of a Heterogenous Terascale Shared
Campus Computing Facility.” June 1, 2010- May 31, 2011 for a total of \$199,480.
- PI on NSF grant DMS- 0802974 “RUI: CSUMS: Research in Scientific Computing in Undergrad-
uate Education (RESCUE).” September 2008-August 2013 for a total of \$788985.
- Co-PI with Jae-Hun Jung on NSF grant DMS-0608844 “RUI: Adaptive High Order Methods for
Solution of PDEs.” August 2006 - July 2010 for a total of \$197,713.
- PI on AFOSR grant FA9550-0610255 “Implicit High Order Strong Stability Preserving Runge-
Kutta Time Discretizations.” March 2006-December 2008, for a total of \$98,005.
- PI on NSF grant DMS-0106743 “Development of Numerical Methods for Semiconductor Device
Simulation and Electron Microscopy.” August 2001- August 2003 for a total of \$50,000.

HONORS AND AWARDS

- Presenter for the 2010-2011 Chancellor’s Colloquium Series, December 2, 2010.
- Provost Travel Grant (June 2008) \$1,000.00 for travel to the 2008 SIAM Annual Meeting on July
7-11, 2008 in San Diego, CA to present A WENO/Radial Basis Function Hybrid Method for
Solution of Hyperbolic Time Dependent PDEs.”
- Awarded ARPA-NDSEG Graduate Fellowship April 1993. Funded by it from 9/1/1994 - 8/31/1996.
- Awarded a NSF Graduate Fellowship April 1993 (declined).

Awarded a National Physical Science Consortium Graduate Fellowship for Women and Minorities in the Physical Sciences April 1993 (declined).

Elected associate member of Sigma Xi February 1992.

PROFESSIONAL ACTIVITIES

2007-present: Associate editor of *Journal of Scientific Computing*.

2010-present: Associate editor *SIAM Journal of Numerical Analysis*.

2012-present: Associate editor *Applied Numerical Mathematics*.

2011- present: Member of SIAM Education Committee.

2012-2014: Member of the Association for Women in Mathematics (AWM) Conference Committee.

Reviewed proposals for AFOSR, NSF, and NSERC

Refereed papers for: Applied Mathematics and Computation; Applied Numerical Mathematics; Electronic Journal of Linear Algebra; International Journal of Computational Fluid Dynamics; Journal of Applied Mathematics and Computing Journal of Computational Physics. Journal of Scientific Computing; Mathematical, Physical and Engineering Sciences; Mathematics and Computers in Simulation; Proceedings of the Royal Society: SIAM Journal on Numerical Analysis; SIAM Journal on Scientific Computing

SELECTED INVITED PRESENTATIONS

Plenary Lecture on “Strong Stability Preserving Time Discretizations” at ICOSAHOM 2014, June 23-27, 2014 in Salt Lake City, Utah.

Seminar presentation “Time stepping methods for numerical solution of hyperbolic PDEs with shocks” in MIT’s Mathematics Department’s Numerical Methods for Partial Differential Equations seminar on November 12, 2008.

Workshop talk on “Strong Stability Preserving Time Discretizations” at The Statistical and Applied Mathematical Sciences Institute (SAMSI) Interface Problems Workshop November 15th, 2007 in Research Triangle Park, NC.

Lecture on “SSP Runge-Kutta Time Discretizations” at the AFOSR workshop on “Advances and Challenges in Time-Integration of PDE’s” at Brown University in August 2003.