ANIMIKH BISWAS

Curriculum Vitae

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EDUCATION

Indiana University, Bloomington	Mathematics	Ph.D., 2000.
Indian Statistical Institute (India)	Advanced Probability	M.S., 1993.
Indian Statistical Institute (India)	Statistics	B.S., 1991.

Thesis advisor: Professor Ciprian Foias. **Title:** On the lifting of intertwining operator and their parametrization.

APPOINTMENTS

Associate Professor (tenured)	Univ. of North Carolina-Charlotte	2007 – Present.
Visiting Scientist	CSCAMM (∗), University of Maryland	2009-2010.
Assistant Professor	Univ. of North Carolina-Charlotte	2001 – 2007.
Visiting Assistant Professor	Univ. of North Carolina-Charlotte	2000 – 2001.

(∗) Center for Scientific Computation and Mathematical Modeling.

RESEARCH INTERESTS

- Nonlinear Partial Differential Equations and Fluid Dynamics
  - Euler, Navier-Stokes and related equations.
  - Geophysical Fluid Dynamics and Turbulence Theory.
  - Dynamical Systems and Chaos.
- Functional Analysis and Applications
  - Systems Theory, Interpolation Theory and Robust Control.
  - Functional Data Analysis.

GRANTS

- **NSF Grant (Applied Mathematics Program) DMS 1109532 (Principal Investigator):** Study of turbulence in physical systems through complex singularities and determining modes (Duration: 9/1/2011–8/31/2014, Amount: $ 70,500).
- **Reassignment of Duties grant, 2009-2010 (UNC-Charlotte).**
- **NSF (IMA) travel funding (2010)** "Analysis and computation of incompressible fluid flow", Institute of Mathematics and Applications, Minnesota.
- **NSF (IMA) travel funding (2010)** "Transport and mixing in complex and turbulent flows", Institute of Mathematics and Applications, Minnesota .
- **Junior Faculty Research Grant** UNC-Charlotte (2003).

HONORS AND AWARDS

- **William B. Wilcox Memorial Award** in recognition of outstanding scholastic achievement in graduate studies (Indiana University).
- **P. C. Mahalanobis finalist** (Indian Statistical Institute), *Among top three graduating students for outstanding performance in Masters of Statistics.*
- **Gold Medal** in Bachelor of Statistics (Indian Statistical Institute).

CAREER DEVELOPMENT

- **ADVANCE Leadership Program (UNC-Charlotte):** Invited participant in this NSF funded program.
- **NSF grant to attend New Directions in Mathematics** program at the Institute for Mathematics and its Applications, Minnesota: Biophysical Fluid Dynamics, Summer 2006.
- **NSF funding to attend New Directions in Mathematics** program at the Institute for Mathematics and its Applications, Minnesota: Quantum Computation, Summer 2005.

PUBLICATIONS

1. H. Bae and A. Biswas, Gevrey regularity for a class of dissipative equations with analytic nonlinearity, submitted *Journal of Functional Analysis,* (29 pages). (†)

2. A. Biswas, Gevrey regularity for a class of dissipative equations with applications to decay, submitted *Journal of Differential Equations,* (26 pages). (†)

3. A. Biswas and C. Foias, On the maximal spatial analyticity radius for the 3D Navier-Stokes equations and turbulence, submitted *Annali di Matematica Pura ed Applicata,* (42 pages). (†)

4. H. Bae, A. Biswas and E. Tadmor, Analyticity of the Navier-Stokes equations in critical Besov spaces $\dot{B}^{\frac{3}{p}-1}_{p,q}$, submitted *Archive for Rational Mechanics and Analysis,* (22 pages). (†)

5. A. Biswas and E. Tadmor, Dissipation versus quadratic nonlinearity: from *a priori* estimates to higher Sobolev regularizing effect, *Preprint,* (21 pages). (†)

6. H. Bae, A. Biswas and E. Tadmor, Analyticity of the subcritical and critical quasi-geostrophic equations in critical Besov spaces, *Preprint,* (20 pages). (†)

7. A. Biswas, D. Swanson, Navier-Stokes equations and weighted convolution inequalities in groups, Communications in Partial Differential Equations, **vol. 35**, 559-589 (2010).

8. J. Ball, A. Biswas, Q. Fang, S. ter Horst, Multivariable generalizations of the Schur class: positive kernel characterization and transfer function realization, *Operator Theory: Advances and Applications*, **vol. 197**, 17-79 (2008)

9. A. Biswas, A. Lambert, S. Petrovic, B. Weinstock, On spectral radius algebras, *Operators and Matrices*, **vol. 2**, (2008), 167-176.

10. A. Biswas and D. Swanson, Existence and generalized Gevrey regularity of solutions to the Kuramoto-Sivashinsky equation in $\mathbf{R}^n$, *Journal of Differential Equations,* **240**, (2007), 145-163.

11. A. Biswas and D. Swanson, Gevrey regularity of solutions to the 3-D Navier-Stokes equations with weighted ℓ_p initial data, *Indiana University Mathematics Journal,* **56** (2007), 1157 - 1188.

12. A. Biswas and D. Swanson, Gevrey regularity of solutions to the 3-D Navier-Stokes equations, *Contemporary Mathematics*, (2007), **440**, 83-90.

13. A. Biswas, A. Lambert and S. Petrovic, On spectral radius algebras and normal operators, *Indiana University Mathematics Journal,* **56** (2007), 1661-1674.

14. A. Biswas and R. Sundaram, Kernel survival function estimation with doubly censored data, *Communications in Statistics: Theory and Methods*, **35**, no. 7 (2006), 1293 - 1307.

15. A. Biswas and S. Petrovic, On extended eigenvalues of operators, *Integral Equations and Operator Theory* **55**, no. 2 (2006), 233-248.

16. A. Biswas and C. Foias, On the general intertwining lifting problem. I, *Acta Sci. Math. (Szeged)*, **72** (2006), 271 - 298.

17. A. Biswas, Local existence and Gevrey regularity of 3-D Navier-Stokes equations with ℓ_p initial data, *Journal of Differential Equations*, **215** (2005), 429-447.

18. A. Biswas, C. Foias, A. E. Frazho, An intertwining property of positive Toeplitz operators, *Journal of Operator Theory*, **54** (2005), 301-322.

19. A. Biswas, A. Lambert, S. Petrovic, Extended eigenvalues and the Volterra operator. *Glasg. Math. J.* **44** (2002), no. 3, 521 - 534.

20. A. Biswas, C. Foias, A. E. Frazho, Weighted variants of the three chains completion theorem. *Recent advances in operator theory and related topics,* 127 - 144, Oper. Theory Adv. Appl., 127, *Birkhäuser, Basel, 2001.*

21. A. Biswas, A harmonic-type maximal principle in the three chains completion problem, *Integral Equations and Operator Theory* **36** (2000), no. 4, 396 - 408.

22. A. Biswas, C. Foias, A. E. Frazho, Weighted commutant lifting, *Acta Sci. Math. (Szeged)* **65** (1999), no. 3-4, 657 - 686.

23. A. Biswas, A harmonic-type maximal principle in commutant lifting, *Integral Equations and Operator Theory* **28** (1997), no. 4, 373 - 381.

24. A. Biswas, Maximal principle in commutant lifting and systems, Chapter VI.5 in *Metric constrained interpolation, commutant lifting and systems* 657 - 686. by C. Foias, A. E. Frazho, I. Gohberg and M. A. Kaashoek, O.T. Adv. Appl. vol. 100, (1998), Birkhauser.

(†): See http://www.math.uncc.edu/˜abiswas/researchpage/index.html

UNDER PREPARATION

- A. Biswas, Existence and regularity for the tridiagonal model of turbulence.
- A. Biswas and C. Foias, Analyticity domain on the attractor for the Navier-Stokes equations.
- A. Biswas and E. Tadmor, Navier-Stokes equations in critical geometric regularity spaces.

- A. Biswas, M. Jolly, V. Martinez and E. Titi, Exponential decay of Fourier power spectrum and Kolmogorov dissipation length scale in turbulence.
- N. Balci, A. Biswas, M. Jolly and E. Titi, Effect of rotation on turbulent flows.
- R. Sundaram, A. Biswas, J. Grewal, S. Laughon, U. Reddy, J. Zhang, Statistical inference for dynamical systems modeling labor progression.
- R. Sundaram and A. Biswas, Joint modeling of stress, intercourse and hormonal profiles: a functional data analytic approach.

INVITED RESEARCH VISITS

- Research Visit: Indiana University, Spring 2012 (one week).
- Research Visit: Texas A & M University, Spring 2011 (one week).
- Visiting Scientist, Center for Scientific Computation and Mathematical Modeling, University of Maryland, College Park (Fall 2009 and Spring, 2010).
- Received invitation and funding to attend CSCAMM workshop at University of Maryland, College Park in Fall 2008.
- Received invitation and funding to attend CSCAMM workshop at University of Maryland, College Park in Fall 2006.
- Research Visit: Indiana University, Summer 2006.

INVITED TALKS

- University of Maryland, Mathematics Department (2011), **Title:** Navier-Stokes equations in geometrically based regularity spaces.
- University of Maryland, Mathematics Department (2010), **Title:** Analyticity and Gevrey class technique for Navier-Stokes and related equations.
- The sixth IMACS international conference, University of Georgia, Athens, (2009), **Title:** Navier-Stokes equations in geometrically based regularity spaces.
- Mathematical Theory of Networks and Systems, Blacksburg, Virginia (2009), **Title:** Relaxed Commutant Lifting for Correspondences.
- International Workshop in Operator Theory, Williamsburg, Virginia (2009), **Title:** Multivariable generalization of the Schur class.

- Colloquium talk at University of Virginia, Charlottesville (2008), **Title:** Gevrey regularity of Navier-Stokes equations with rough initial data (one hour), University of Virginia, Charlottesville. **Title:** Multivariable generalization of the Schur class.
- AMS Sectional Meeting talk in Bloomington, Indiana (2008). **Title:** Convolution inequalities and Navier-Stokes equations.
- International Conference on Dynamical Systems and Differential Equations, Arlington, Texas (2008), **Title:** 3D Navier-Stokes equations in time varying Gevrey spaces.
- Colloquium talk at Indian Statistical Institute, Bangalore, India, May 2006. **Title** Commutant lifting in univariate and multivariate setup.
- Colloquium talk at Institute of Mathematical Sciences, Chennai, India, May 2006. **Title** Commutant lifting in univariate and multivariate setting
- Seminar talk at Virginia Tech, Blacksburg, March 2006. **Title** The geometry of $*$-regular dilation.
- AIMS international conference on Dynamical Systems at Pomona, California, 2004. **Title:** Gevrey regularity of Navier-Stokes equations in ℓ_p spaces.
- Seminar talk at Virginia Tech, Blacksburg, February 2006. **Title:** Multivariate dilation theory and commutant lifting.
- Colloquium talk at Virginia Tech, Blacksburg, September, 2004. **Title:** Interpolation problems and commutant lifting.
- Colloquium talk at Texas A & M University, College Station, March 2002. **Title:** Causal commutant lifting, commutant lifting and the Carswell-Schubert theorem.
- Colloquium talk at University of North Carolina, Chapel Hill, March 2001. Title: Weighted interpolation, commutant lifting and extension of intertwining operators.
- Functional Analysis and Applications: Memorial Conference for Béla Szökefalvi-Nagy, August 2 - August 6, 1999, Szeged, Hungary. **Title:** Weighted variant of three chains completion theorem.

OTHER TALKS

- AMS Sectional Meeting, Charlotte, North Carolina, October 15 - October 17, 1999. **Title:** Weighted Commutant Lifting.

- South East Analysis Meeting, University of Georgia, Athens, April, 2001. **Title:** Extended eigenvalues and the Volterra Operator.
- International Workshop on Operator Theory and Applications, Virginia Tech, Blacksburg, August 6 -9, 2002. **Title:** Intertwining Lifting of operators.
- South East Analysis Meeting, University of Tennessee, Knoxville, March 21 - 23, 2003. **Title:** A characterization of positive, quasi-analytic Toeplitz operators.

PROFESSIONAL SERVICE

- **Reviewer for NSF Grant** (DMS Computational Mathematics Program).
- Organized invited session in turbulence at the SIAM conference on "Analysis of Partial Differential Equations", San Diego, November, 2011.
- Organized invited session on "Fluid Dynamics and Turbulence" at the AIMS international conference on "Dynamical systems, Differential Equations and Applications, 2008", Arlington, Texas.
- Organized joint Analysis Seminar in Fall (2005, 2006) and Spring Semester (2006) with Virginia Tech at Blacksburg, VA.
- Refereed/Reviewed articles (about 50) for
  - Acta Sci. Math. (Szeged)
  - Boletin de la Sociedad
  - Discrete and Continuous Dynamical Systems
  - Electronic Journal of Differential Equations
  - Far East Journal of Mathematics
  - Integral Equations and Operator Theory
  - Journal of the Indian Institute of Science
  - Journal of Mathematical Analysis and Applications
  - Journal of Mathematical Physics
  - Journal of Operator Theory
  - Mathematical Reviews
  - Nonlinearity
  - Proceedings of the American Mathematical Society

TEACHING EXPERIENCE

Undergraduate Courses Taught

- Calculus-I
- Calculus-II
- Calculus-III
- Finite Mathematics
- College Algebra
- Linear Algebra
- Introductory Statistics for Social Sciences
- Introductory Statistics for Business Majors
- Mathematics for Elementary School Teachers

Graduate Courses Taught

- Partial Differential Equations.
- Real Analysis
- Analysis I
- Analysis II
- Co-taught research topics course on Mathematical Fluid Dynamics
- Functional Analysis and Control Theory (guest lecturer at Indiana University)
- Multiple Independent studies and research seminars on
  - Continuum Mechanics and Fluid Dynamics
  - Infinite Dimensional Dynamical Systems
  - Quantum Computation

Senior projects supervised

- Discrete Dynamical Systems,
- Image Processing
- Linear Statistical Models
- Generalized inverse of matrices and applications to Statistics
- Spectral theory of matrices and application to principal component analysis

Service in Exam/Thesis Committees

- Author of statistics/algebra common final last eight years.
- Served in several Ph.D. Preliminary Exam Committees last four years (Analysis, Partial Differential Equations).
- Ph.D. Thesis: Currently serving in the Ph.D. thesis committee for Hounkali Kokouvi and Hamid Semiyari (Mathematics).
- Ph. D. Thesis: Kannan Subramanian (Mechanical Engineering) **Title:** Microstructural modeling during Multi-Pass rolling of Nickel-base Superalloy
- Master's Qualifying Exam (Chair): Tracy Cronin, 2007
- Ph. D. Thesis: John Herron (Mathematics, 2005) **Title:** Weighted conditional expectation operators on L^p spaces
- Master's Qualifying Exam – John Herron (Mathematics, 2004)
- Ph. D. Thesis: Liang Zhang (Mechanical Engineering, 2004) **Title:** Fiber-optic coupled heterodyne interferometer
- Ph. D. Thesis: Yang Cao (Electrical and Computer Engineering, 2001) **Title:** Gain-Flattened ultra wideband fiber amplifiers
- Master's Thesis–Neha Shah (Mathematics, 2001) Numerical methods in Krylov Spaces

COMMITTEE WORK

- Undergraduate Research Symposium liaison (Math and Stat Department)
- Graduate TA Recruitment Committee
- High school mathematics contest committee
- Putnam Committee
- Computer Advisory Committee (Chair)
- Webwork Committee (Chair)
- Undergraduate Curriculum Committee
- Library Committee
- Mathematics Tutorial Committee
- Graduate Curriculum Committee
- Computer/Calculator Lab Committee
- Department Advisory Committee