ANIMIKH BISWAS

Curriculum Vitae

MP440 Mathematics and Psychology Bldg.	*Ph: (410)455-3029 (Off)*
Dept. of Mathematics & Statsitics	*Ph: (704)458-1426 (Cell)*
University of Maryland, Baltimore County	*Email : abiswas@umbc.edu*
1000 Hilltop Circle, Baltimore, MD 21250.	*Webpage:* http://www.umbc.edu/~abiswas

EDUCATION

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

APPOINTMENTS

Year	Institution	Rank	Department
2013-	U. of Maryland, Baltimore County	Associate Professor	Math. & Stat.
2007-13	U. of North Carolina-Charlotte	Associate Professor	Math. & Stat.
2009-10	U. of Maryland, College Park	Visiting Scientist	CSCAMM.
2001-07	U. of North Carolina-Charlotte	Assistant Professor	Math. & Stat.
2000-01	U. of North Carolina-Charlotte	Visiting Assistant Professor	Math. & Stat.

PRIMARY RESEARCH INTEREST

Nonlinear Partial Differential Equations and Mathematical Fluid Dynamics

- Euler, Navier-Stokes and related equations: Well-posedness, Asymptotic Dynamics, Theory of Statistical Solutions and Turbulence.

- Geophysical Fluid Dynamics.

- Dynamical Systems and Chaos.

OTHER RESEARCH INTERESTS

Functional Analysis and Applications

- Functional Data Analysis.

- Systems Theory, Interpolation Theory and Robust Control.

HONORS AND AWARDS

- 1995, **William B. Wilcox Memorial Award** (Indiana University, Bloomington) in recognition of outstanding scholastic achievement in graduate studies.

- 1993, **P. C. Mahalanobis finalist** (Indian Statistical Institute), *Among top three graduating students for outstanding performance in Masters of Statistics.*

- 1991, **Gold Medal** in Bachelor of Statistics (Indian Statistical Institute).

RESEARCH SUPPORT/FELLOWSHIP

- 9/15/2015-8/31/2018, $173,121, NSF DMS/Applied Mathematics Program (DMS-1517027), "Collaborative Research: Deterministic and statistical relations between the Navier-Stokes equations and its determining forms", **Principal Investigator.**

- 11/18/13-8/31/15, $ 32,153 NSF (Applied Mathematics Program) DMS 1425877, "Collaborative Research: Study of turbulence in physical systems through complex singularities and determining modes"; **Principal Investigator.**

- 7/1/2016-6/30/18, $404,210.90, NIH, "Automated functional and behavioral health assessment of older adults", **Co-Investigator**, *Pending.*

- 9/1/11-11/17/13, $ 38, 347 NSF (Applied Mathematics Program) DMS 1109532, Collaborative Research: Study of turbulence in physical systems through complex singularities and determining modes", **Principal Investigator.**

- 2/22-26/2010, $3000 NSF travel funding to attend "Analysis and computation of incompressible fluid flow", Institute of Mathematics and Applications, Minnesota.

- 4/12-16/2010, $3000 NSF travel funding to attend "Transport and mixing in complex and turbulent flows", Institute of Mathematics and Applications, Minnesota.

- 2003, $6000 Junior Faculty Research Fellowship, University of North Carolina-Charlotte.

CAREER DEVELOPMENT

2012, ADVANCE Leadership Program (Univ. of North Carolina-Charlotte), Selected by the Dean to participate in this NSF funded program.

Ph.D. STUDENT

- Joshua Hudson, 2018 (expected), Thesis Committee Chair, University of Maryland-Baltimore County.

- Vincent Martinez, Defended 4/23/2014, Co-Mentor and Thesis Committee Member, Indiana University.

- Jonathan McHenry, Defended 11/21/2014, Thesis Committee Member, University of Maryland-Baltimore County.

- Serap Tay, May, 2014, served in Oral Exam Committee, University of Maryland-Baltimore County.

- Kannan Subramanian, University of North Carolina-Charlotte, Defended 2007, Thesis Committee Member.

- John Herron, University of North Carolina-Charlotte, Defended 2005, Thesis Committee Member.

- Yang Cao, University of North Carolina-Charlotte, Defended 2001, Thesis Committee Member.

MASTER'S (THESIS/ORAL)

- Tracy Cronin, 2007, Committee Chair, University of North Carolina-Charlotte.

- John Herron, 2004, Committee Member, University of North Carolina-Charlotte.

- Neha Shah, 2001, Committee Member, University of North Carolina-Charlotte.

UNDERGRADUATE STUDENT

- Patrick Ellsworth, Oberlin College, Summer Intern at NIH; co-mentored with Dr. R. Sundaram (*Eunice Kennedy Shriver National Institute of Child Health*, NIH); poster presented at NIH research fair: *A Mathematical Modeling of Progression of First Stage of Spontaneous Labor;* manuscript is in preparation.

- Rohiel Ahmad, University of Maryland-Baltimore County, Parameter Identification Problem in Neuronal Dendritic Trees, Independent Study.

- Adam Reddan, University of Maryland-Baltimore County, Parameter Identification Problem in Neuronal Dendritic Trees, Independent Study.

- Christopher Turner, University of Maryland-Baltimore County, Parameter Identification Problem in Neuronal Dendritic Trees, Independent Study.

TEACHING

University of Maryland-Baltimore County

- Spring 2015: Math 710 (Topics Course in Fluid Dynamics)

- Spring 2015: Math 898 (Pre-Candidacy Doctoral Research)

- Fall 2014: Math 301 (Mathematical Analysis I)

- Fall 2014: Math 614 (Partial Differential Equations)

- Fall 2014: Math 499 (Independent Study in Mathematics)

- Fall 2014: Math 898 (Pre-Candidacy Doctoral Research)

- Spring 2014: Math 302 (Mathematical Analysis II)

- Spring 2014: Math 898 (Pre-Candidacy Doctoral Research)

- Fall 2013: Math 251 (Multivariable Calculus)

University of North Carolina-Charlotte

Undergraduate Courses

- Math 1241 (Calculus-I, Math 151 UMBC equivalent)

- Math 1242 (Calculus-II, Math 152 UMBC equivalent)

- Math 2241 (Calculus-III, Math 251 UMBC equivalent)

- Math 1100, (College Algebra, Math 106/150 UMBC equivalent)

- Math 2164 (Matrices and Linear Algebra, Math 221 UMBC equivalent)

- Stat 1222 (Introduction to Statistics, STAT 121 UMBC equivalent)

- Stat 1220 (Elements of Statistics I (BUSN), STAT 351 UMBC equivalent)

Graduate Courses

- Math 5174 (Partial Differential Equations, Math404 UMBC equivalent)

- Math 7143 (Real Analysis I, Math 601(Measure Theory) UMBC equivalent)

- Math 7144 (Real Analysis II, Math 601(Measure Theory) UMBC equivalent)

- Math 5143 (Analysis I, Math 600 UMBC equivalent)

- Math 5144 (Analysis II, Math 600 UMBC equivalent)

- Co-taught research topics course on Mathematical Fluid Dynamics

- Several Independent studies and research seminars on
  – Continuum Mechanics and Fluid Dynamics
  – Infinite Dimensional Dynamical Systems
  – Quantum Computation

PUBLICATIONS (Peer Reviewed Journals)

1. Animikh Biswas, Vincent Martinez and Prabath Silva, On Gevrey regularity of the super-critical SQG equation in critical Besov spaces, accepted (2015), *Journal of Functional Analysis*, 40 pages.

2. Hantaek Bae and Animikh Biswas, Gevrey regularity for a class of dissipative equations with analytic nonlinearity, accepted (2015), *Methods and Applications of Analysis*, 31 pages.

3. A. Biswas, M. S. Jolly, V. Martinez and E. S. Titi, Dissipation length scale estimates for turbulent flows: A Wiener algebra approach, *Journal of Nonlinear Science,* **24** (2014), no. 3, 441-471.

4. A. Biswas, Gevrey regularity for the supercritical quasi-geostrophic equation, *Journal of Differential Equations*, **257** (2014), 1753-1772.

5. A. Biswas and E. Tadmor, Dissipation vs quadratic nonlinearity: From *a priori* energy bound to higher-order regularizing effect, *Nonlinearity*, **27** (2014), no. 3, 545-562.

6. A. Biswas and C. Foias, On the maximal spatial analyticity radius for the 3D Navier-Stokes equations and turbulence, *Annali di Matematica Pura et Applicata (4),* **193** (2014), no. 3, 739-777.

7. H. Bae, A. Biswas and E. Tadmor, Analyticity and decay estimates of the Navier-Stokes equations in critical Besov spaces, *Archives for Rational Mechanics and Analysis,* **205** (2012), 963-991.

8. A. Biswas, Gevrey regularity for a class of dissipative equations with applications to decay, *Journal of Differential Equations,* **253** (2012), 2739-2764.

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

10. J. Ball, A. Biswas, Q. Fang, S. ter Horst, Multivariable generalizations of the Schur class: positive kernel characterization and transfer function realization, *Recent Advances in Operator Theory and applications* 17-79, Operator Theory: Advances and Applications, **187** (2008), 17-79.

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

12. 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.

13. 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.

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

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

16. A. Biswas and R. Sundaram, Kernel survival function estimation with doubly censored data, *Communications in Statistics: Theory and Methods*, **35** (2006), 1293 - 1307.

17. A. Biswas and S. Petrovic, On extended eigenvalues of operators, *Integral Equations and Operator Theory* **55** (2006), 233-248.

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

19. 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.

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

21. A. Biswas, A. Lambert, S. Petrovic, Extended eigenvalues and the Volterra operator. *Glasg. Math. J.* **44** (2002), 521 - 534.

22. 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.

23. A. Biswas, A harmonic-type maximal principle in the three chains completion problem, *Integral Equations and Operator Theory* **36** (2000), 396 - 408.

24. A. Biswas, C. Foias, A. E. Frazho, Weighted commutant lifting, *Acta Sci. Math. (Szeged)* **65** (1999), 657 - 686.

25. A. Biswas, A harmonic-type maximal principle in commutant lifting, *Integral Equations and Operator Theory* **28** (1997), 373 - 381.

PUBLICATIONS (Other)

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

SUBMITTED
(Articles in Peer Reviewed Journals)

- A. Biswas, C. Foias and A. Larios, A generalized notion of attractor for the semi-dissipative Boussinesq equations, *submitted*, 7/2015, 37 pages.

- J. Bell and A. Biswas, Cross-chemotaxis system derived from an atherosclerotic plaque model, *to be submitted.*

UNDER PREPARATION

- A. Biswas and E. Tadmor, Infinite order energy functionals for a class of nonlinear equations in a bounded domain, *in preparation.*

- A. Biswas and C. Foias, Navier-Stokes equations in near *Shangri la* functional spaces, *in preparation.*

- A. Biswas, M. Jolly, V. Martinez and E. Titi, Effect of rotation on turbulent flows, *in preparation.*

- A. Biswas, M. Jolly and V. Martinez, Behavior of critical Besov norms on the attractor for the Navier-Stokes equations, *in preparation.*

- R. Sundaram and A. Biswas, Statistical inference for dynamical systems modeling labor progression, *in preparation.*

- R. Sundaram, A. Biswas and L. Ma, Joint modeling of stress, intercourse and hormonal profiles: a functional data analytic approach, *in preparation.*

INVITED CONFERENCE PRESENTATIONS (SELECTED)

- *On the attractor for the semi-dissipative Boussinesq Equations,* SIAM Conference on Analysis of Partial Differential Equations, 12/2015, Scottsdale, Arizona.

- *Generalized Gevrey Norms with applications to Dissipative Equations,* SIAM Conference on Analysis of Partial Differential Equations, 12/2015, Scottsdale, Arizona.

- *Navier-Stokes equations in a Constantin-Chen class of functional spaces,* AMS Conference, Georgetown University, 3/2015.

- *Gevrey regularity for quasi-geostrophic equations with applications to decay,* American Mathematical Society (AMS) Conference, Lubbock, Texas, 4/2014.

- *Generalized Gevrey norms with applications to dissipative equations,* Society for Industrial and Actuarial Mathematics (SIAM) Conference, Lake Buena Vista, Florida, 12/2013.

- *Gevrey regularity for dissipative equations with applications to decay, AIMS International Conference on Dynamical systems,* Differential Equations and Applications, Orlando, Florida, 7/2012.

- *Maximal analyticity radius for the Navier-Stokes equations with connections to turbulence, AIMS International Conference on Dynamical systems,* Differential Equations and Applications, Orlando, Florida, 7/2012.

- *Spatial analyticity and turbulence in fluids,* Society for Industrial and Actuarial Mathematics (SIAM) Conference, San Diego, California, 11/2011.

- *Spatial analyticity, Gevrey regularity and its applications in fluid dynamics,* International Fluid Dynamics Conference, Campinas, Brazil, 6/2011.

- *Navier-Stokes equations in geometrically based regularity spaces,* The sixth IMACS international conference, University of Georgia, Athens, 7/2009.

- *Relaxed Commutant Lifting for Correspondences,* Mathematical Theory of Networks and Systems, Blacksburg, Virginia 6/2009.

- *Multivariable generalization of the Schur class, International Workshop in Operator Theory,* Williamsburg, Virginia 6/2009.

- *Convolution inequalities and Navier-Stokes equations,* AMS Conference, Bloomington, Indiana (2008).

INVITED COLLOQUIUM/SEMINAR PRESENTATIONS
(SELECTED)

- *On the attractor for the semi-dissipative Boussinesq Equations,* PDE and Functional Analysis Seminar, Texas A&M University, College Station, Texas, 10/2015.

- *Navier-Stokes equations in a generalized Gevrey class,* Seminar at the Institute for Scientific Computing and Applied Mathematics, Indiana University, Bloomington, IN, 3/2015.

- *Navier-Stokes equations in a Constantin-Chen class of functional spaces,* Institute of Pure and Applied Mathematics *(IPAM)*, UCLA; 10/2014.

- *Maximal spatial analyticity radius, intermittency and energy cascades in 3-D Navier-Stokes equations,* Mathematics Department Colloquium talk, Indiana University, Bloomington, IN, 2/2012.

- *Navier-Stokes equations in geometrically based regularity spaces,* University of Maryland, Mathematics Department, Seminar talk, 3/2010.

- *Analyticity and Gevrey class technique for Navier-Stokes and related equations,* University of Maryland, Mathematics Department, Seminar talk, 10/2009.

- *Gevrey regularity of Navier-Stokes equations with rough initial data,* Colloquium talk, University of Virginia, Charlottesville, 10/2008.

- *Commutant lifting in univariate and multivariate set-up,* Colloquium talk, Indian Statistical Institute, Bangalore, India, May 2006.

- *Commutant lifting in univariate and multivariate setting,* Colloquium talk at Institute of Mathematical Sciences, Chennai, India, May 2006.

- *The geometry of ∗-regular dilation,* Seminar talk, Virginia Tech, Blacksburg, March 2006.

SERVICE

- **Department Service (University of Maryland-Baltimore County)**

  - Graduate Program Director, January 2015–.
  - Graduate Committee (Member) 2013-14.
  - Applied Math. Hiring Committee (Member), 2013-14.

- **Department Service (University of North Carolina-Charlotte)**

  - 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

- **College Level (UNC-Charlotte)** Served in committee for designing Award for integration of undergraduate teaching and research in the College of Liberal Arts and Sciences, 2012-13.

- **Professional Service**

  - Reviewer for the following journals:
    * *AMS Mathematical Reviews*
    * *Biometrics*
    * *Communications in Information Systems*
    * *Discrete and Continuous Dynamical Systems*
    * *Electronic Journal of Differential Equations*
    * *Journal of Differential Equations*
    * *Journal of the Indian Institute of Science*
    * *Journal of Mathematical Analysis and Applications*
    * *Journal of Mathematical Physics*
    * *Journal of Operator Theory*
    * *Nonlinearity*
    * *Numerical Functional Analysis*
    * *Proceedings of the American Mathematical Society.*
  - Reviewer for NSF Grant (DMS Computational Mathematics Program).

– Organization of Conference and workshops

* Workshop organizer, *Fluid Models, Turbulence and Data Assimilation,* SIAM Conference on Analysis of Partial Differential Equations, Scottsdale, Arizona, 12/2015 (Pending approval).

* Workshop organizer at UMBC, *Analysis of Nonlinear PDEs and Fluid Flows,* 1/2014.

* Symposium organizer and chair, *Turbulence and Mixing in Fluids: Analysis and Applications,* Joint Mathematics Meeting, Baltimore, 1/2014,

* SIAM symposium organizer and chair, *Global attractors, dissipative dynamical systems and turbulence,* Orlando, Florida 9/2013.

* SIAM Conference on Analysis of Partial Differential Equations, San Diego, November 14 17, 2011 (about 500 participants in the conference). Organized symposiums: *Turbulence and Statistical Solutions in Incompressible Flows-I and II (8 speakers),* Sponsored by SIAM activity group Analysis of PDE.

* Co-organizer of NSF funded workshop (part of joint collaborative NSF grant) on fluid dynamics, Title: Incompressible Fluids workshop, February 16-20, 2012, College Station, Sponsor: NSF grant and Texas A & M University, Mathematics Department. (25 participants including graduate students and Post Docs from Texas A & M, Indiana University, University of California-Irvine and Weizmann Institute, Israel.

* Organized session titled Fluids and Turbulence (18 participants) at the AIMS International Conference on Dynamical Systems and Differential Equations (held in Arlington, Texas in 2008). This is a major conference in the discipline with 700 international participants (http://aimsciences.org/AIMS-Conference/2008/). The session was partially sponsored by American Institute of Mathematical Sciences. The goal of the session was to bring together leading scientists as well as young researchers in the field. The main focus was on (i) existence, uniqueness and regularity results for equations of fluid dynamics (ii) long time behavior of solutions (iii) study of the global attractor in relation to turbulence (iv) qualitative behavior of solutions (v) computational aspects of fluid dynamics.