CURRICULUM VITAE

ALEXANDER LABOVSKY

Department of Mathematical Sciences,
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Employment

- Assistant Professor, Michigan Technological University, 2011–present.
- PostDoctoral Scholar, Florida State University, 2009–2011.
- PostDoctoral Scholar, University of Missouri-Columbia, 2008–2009.

Education

- Ph.D. in Mathematics, University of Pittsburgh, 2003-2008
  Advisor: Professor William J. Layton
  Ph.D. Thesis: Mathematical Architecture for Models of Fluid Flow Phenomena.
- B.S. in Computational Mathematics and Computer Science, Moscow State University, Moscow, Russia, 1997-2002.
  Advisor: Professor V.B. Andreev
  B.S. Thesis: "On a monotonicity of a four point scheme for singularly perturbed convection diffusion problem"

Research Interests

Computational Fluid Dynamics and Applications

> Navier-Stokes Equations
> Large Eddy Simulation of Turbulence
> Approximate deconvolution models of turbulence
> Multiscale Models and Computations

Coupled NS systems: MagnetoHydroDynamics

> Phenomenology of MHD Turbulence
> Turbulent models for MHD

Numerical Methods for Partial Differential Equations

> High Accuracy Discretization
> Multiscale Methods
> Finite Element Methods
> Spectral Methods

Stochastic Analysis of PDEs (Uncertainty Quantification)

> Efficient numerical methods for stochastic PDEs
> Stochastic PDEs in high dimensions: sparse grids, collocation

<u>Dynamical Systems approach to Turbulence</u>

Markov Chain approximations of chaos in ODE systems
Segment Description of Turbulence

<u>Coherent structures in fluid flow</u>

Elucidation and Sensitivity

Publications / Preprints

1. A. Labovsky, *A Defect Correction Method for the Time-Dependent Navier-Stokes Equations*, Numerical Methods for Partial Differential Equations, vol.25(1), pp.1-25, 2008.

2. A. Labovsky, *A Defect Correction Method for the Evolutionary Convection Diffusion Problem with Increased Time Accuracy*, Computational Methods in Applied Mathematics, vol.9(2), pp.154-164, 2009.

3. N. Heitmann, A. Labovsky, *Numerical Analysis of a Method for High Peclet Number Transport in Porous Media*, Journal of Mathematical Analysis and Applications, vol.351(2), pp.721-733, 2009.

4. A. Labovsky, W. Layton, C. Manica, M. Neda, L. Rebholz, *The Stabilized, Extrapolated Trapezoidal Finite Element Method for the Navier-Stokes Equations*, Computer Methods in Applied Mechanics and Engineering, vol.198(9-12), pp.958-974, 2009.

5. A. Labovsky, Y. Charles Li, *A Markov Chain Approximation of a Segment Description of Chaos*, Dynamics of Partial Differential Equations, vol.7, pp.65-76, 2010.

6. M. Gunzburger, A. Labovsky, *Effects of Approximate Deconvolution Models on the Solution of the Stochastic Navier-Stokes Equations*, Journal of Computational Mathematics, vol. 29, pp. 131-140, 2011.

7. A. Labovsky, C. Trenchea, *Large Eddy Simulation for Turbulent Magnetohydrodynamic Flows*, Journal of Mathematical Analysis and Applications, 377 (2011), pp.516-533.

8. A. Labovsky, C. Trenchea, *A family of Approximate Deconvolution Models for MagnetoHydroDynamic Turbulence*, Numerical Functional Analysis and Optimization, vol.31(12), pp.1362-1385, 2010.

9. M. Case, A. Labovsky, L. Rebholz, N. Wilson, *A high physical accuracy method for incompressible magnetohydrodynamics*, International Journal Numerical Analysis and Modeling, Series B, vol. 0 (2), pp. 219-238, 2010.

10. J. Connors, A. Labovsky, *Semi-Implicit Spectral Deferred Correction Methods for a Parabolic Two-Domain Problem*, Applied Numerical Mathematics, under review.

11. M. Gunzburger, A. Labovsky, *High Accuracy Method for Turbulent Flow Problems*, M3AS: Mathematical Models and Methods in Applied Sciences, to appear.

12. M. Gunzburger, A. Labovsky, *An efficient and accurate numerical method for high-dimensional stochastic PDEs*, submitted to SIAM Journal of Scientific Computing, undergoes revision.

Conference Proceedings

13. A. Labovsky, W. Layton, C. Manica, M. Neda, L. Rebholz, I. Stanculescu, C. Trenchea, Mathematical Architecture of Approximate Deconvolution Models of Turbulence, invited presentation at Quality and Reliability of Large-Eddy Simulations

2007. (published by Springer as part of the ERCOFTAC Series, with book title "Quality and Reliability of Large-Eddy Simulations.")

Work in Preparation

14. M. Gunzburger, A. Labovsky, Dimension-sensitive Sparse Grid Collocation Method for Stochastic Partial Differential Equations.

15. K. Galvin, A. Labovsky, H. Lee, L. Rebholz, Modeling the uncertainty in viscoelastic flows with control.

16. A.Labovsky, W. Layton, C. Trenchea, Identification of Averaging Radii for the LES in MHD Flows.

17. A. Labovsky, C. Trenchea, LES Models for Compressible Navier-Stokes Equations.

Conference Talks and Seminars

1. "Models of fluid flow: turbulence and uncertainty quantification", Sandia National Laboratories, February 2011.

2. "Turbulence Modeling for Stochastic Navier-Stokes Equations", SIAM-2010, Pittsburgh, July 2010.

3. "Effects of Approximate Deconvolution Models on the Solution of the Stochastic Navier-Stokes Equations", Conference on Uncertainty Quantification, Edinburgh, Scotland, May 2010.

4. "Turbulence Modeling; Approximate Deconvolution Models." invited talk, Clemson University, April 2010.

5. "Turbulence Modeling in Magnetohydrodynamics and in Stochastic NSE", Graduate Student Seminar, Florida State University, March 2010.

6. "A Deferred Correction Method for a Decoupled Fluid-Fluid Interaction", Computational Mathematics Seminar, Florida State University, February 2010.

7. "A Markov Chain Approximation of a Segment Description of Chaos", Computational Mathematics Seminar, Florida State University, February 2010.

8. "High accuracy partitioned timestepping methods for a two domain problem", AMS sectional meeting, Florida Atlantic University, October 2009.

9. "Modeling of Stochastic Turbulent Navier-Stokes Equations", Computational Mathematics Seminar, Florida State University, October 2009.

10. "High accuracy Methods for PDEs. Turbulent models for Magnetohydrodynamics", Computational Mathematics Seminar, Florida State University, October 2009.

11. "High accuracy numerical methods for fluid flow problems and turbulence modeling", invited talk at the Duke University, April 2009.

12. "Semi-implicit spectral deferred correction methods for a parabolic two domain problem", AMS sectional meeting, NC State University, April 2009.

13. "Approximate Deconvolution Models for MagnetoHydroDynamic Turbulence", AMS sectional meeting, NC State University, April 2009.

14. "Finite element methods. FreeFEM - environment for high-level programming", Numerical Analysis Seminar, University of Missouri-Columbia, April 2009 (coming up).

15. "High accuracy methods for a parabolic two domain problem. Semi-implicit spectral deferred correction methods", Numerical Analysis Seminar, University of Missouri-Columbia, February 2009.

16. "Mathematical Architecture for Models of Fluid Flow Phenomena", Iowa State University, February 2009.

17. "High Accuracy Numerical Methods for PDEs. Turbulence Models in Magne-toHydroDynamics", Differential Equations Seminar, University of Missouri-Columbia, September 2008.

18. "Mathematical Architecture for Models of Fluid Flow Phenomena", University of New Hampshire, February 2008.

19. "LES model of MHD equations. Conservation Laws", Computational Mathematics Seminar, University of Pittsburgh, March 2007.

20. "Defect correction method for the time-dependent Navier-Stokes equations", talk at the Finite Element Circus, Penn State University, Fall 2006.

21. "A Defect Correction Method for Evolutionary PDEs", Computational Mathematics Seminar, University of Pittsburgh, Spring 2006.

Awards

- Diploma cum laude from Moscow State University, 2002
- Culver-Teplitz prize in recognition of outstanding teaching and research performance, University of Pittsburgh, 2007.

Computing skills

- Languages:C++, C, Fortran;
- Applications: Matlab, Maple;
- Software: FreeFEM++

Teaching (Universities of Pittsburgh, Missouri, and Michigan Tech)

- Year 2011-2012 (MTU) - Instructor for Calc I and Calc II.
- Year 2008-2009 (University of Missouri-Columbia) - Instructor for Calc III.
- Fall 07: (TA) Matrices and Linear Operators,(grader) Numerical methods for PDE - graduate courses;
- Spring 07: (TA) Calculus I,
- Fall 06 : (Instructor) Calculus II,
- Summer 06 : (Instructor) Calculus II,
- Spring 06: (TA) Calculus I,
- Fall 05 : (TA and grader) Calculus II, Linear Algebra - graduate course,
- Summer 05 : (Instructor) Calculus I, Calculus II,
- Spring 05: (TA) Calculus I,
- Fall 04 : (TA) Calculus I,
- Summer 04 : (TA) PreCalculus, Business Calculus,
- Spring 04: (TA) PreCalculus.

Residency Status

I am a citizen of the USA.

References

- Prof. William J. Layton, Department of Mathematics, University of Pittsburgh, phone: (412) 624-8375, e-mail: wjl@pitt.edu

- Prof. Max Gunzburger, Frances Eppes Eminent Professor and Chair, Department of Scientific Computing, Florida State University, phone: (850) 644-7060, e-mail: gunzburg@fsu.edu
- Prof. Catalin Trenchea, Department of Mathematics, University of Pittsburgh, phone: (412) 624-5681, e-mail: trenchea@pitt.edu
- Prof. M. Sussman, Department of Mathematics, University of Pittsburgh, phone: (412) 624-1273, e-mail: sussmanm@math.pitt.edu
- Prof. C. Chicone, Department of Mathematics, Univ. of Missouri, Columbia, phone: (573) 882-6331, e-mail: chiconec@missouri.edu

CV was updated on 09/01/2011