

# Curriculum Vitae

## BOJAN POPOV

### Address

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### Education

- **Ph.D. University of South Carolina**, August 1999  
*Thesis:* “Linear transport equations”
- **M.S. Mathematics, University of Sofia**, June 1992  
*Thesis:* “Bernstein’s operators with Jacobi weights, Quadrature formulas in functional classes determined by averaged moduli of smoothness”

### Research Interests

- Numerical Methods for Partial Differential Equations
- Linear Transport Equations and Approximation Theory

### Grant Support

- ONR Grant: “Advanced Methods for Data/Image/Signal Processing”, June 15 – August 15, 2000, total funding \$11,020.
- ONR Grant: “Advanced Methods for Data/Image/Signal Processing”, June 15 – August 15, 2001, total funding \$11,320.
- Conference funding from Texas A&M, IMA and NSF for “Approximation and learning in High Dimensions”, October 2007, CO-PI, \$23000;
- NSF, DMS, Computational Mathematics, Award Number 0811041: “L1-based Approximations of PDEs”, CO-PI, (with Jean-Luc Guermond as PI), June 15, 2005 – May 31, 2008, \$677,545.
- Conference funding from Texas A&M, IMA and ARO for “Nonlinear approximation techniques using L1”, May 2008, CO-PI, total funding \$22,500.
- NSF, DMS, Computational Mathematics, Award Number 0811041: “L1-based Approximations of PDEs”, PI, (with Jean-Luc Guermond as CO-PI) July 1, 2008 – June 30, 2011, total funding \$329,997.

- KAUST Global Research Partnership Center Grant, IAMCS Investigator, total funding \$25,000,000.
- DOE-LLNL, Support of Stockpile Stewardship Program, CO-PI, total funding \$2,936,677.
- DOD-AFOSR, “L1-based Approximations of PDEs and Applications”, CO-PI, (with Jean-Luc Guermond as PI), 2009 – 2011, total funding \$344,986.
- KAUST innovation award, PI, June 2011 – May 15 2012, total funding \$25,000.

## Professional Experience

- **Associate Professor, Department of Mathematics, Texas A&M University,** September 2007 – present
- **Assistant Professor, Department of Mathematics, Texas A&M University,** August 2001 – August 2007
- **Assistant Professor (postdoc), Department of Mathematics, Vanderbilt University,** September 1999 – July 2001

## Teaching Experience

- **Assistant Professor, Department of Mathematics, Texas A&M University,** September 2001 – August 2007  
*Courses:* Vector Calculus, Linear Algebra, Numerical Analysis, Matrix Computations, Topics in Applied Mathematics I, Differential Equations, Partial Differential Equations, Hyperbolic Conservation Laws
- **Assistant Professor, Department of Mathematics, Vanderbilt University,** September 1999 – July 2001  
*Courses:* Methods of Linear Algebra, Linear Algebra, Calculus, Numerical Analysis

## Conference Presentations

1. “Entropy viscosity”, Numerical Methods for Incompressible Fluid Flow, University of British Columbia, July 12-17, 2011.
2. “Entropy viscosity”, KAUST-IAMCS Workshop on Multiscale Modeling, Advanced Discretization Techniques, and Simulation of Wave Propagation, May 7-8, 2011.
3. “Entropy viscosity”, Wavelets and Multiscale Methods, Oberwolfach, Germany, August 1 - August 7, 2010.
4. “Approximating PDEs in L1”, Sparsity and Computation, Bonn, Germany, June 7 - June 11, 2010.
5. “Entropy viscosity”, HYP2010, 13th International Conference on Hyperbolic Problems; Theory, Numerics, Applications, Beijing, China, June 15-19, 2010.

6. “Entropy viscosity”, Multimat 2009; Numerical methods for multi-material fluids and structures, Pavia, Italy, September 21-25, 2009.
7. “Surface Reconstruction via L1-Minimization”, invited minisimposium talk, 33rd SIAM Southeastern-Atlantic Section Conference, University of South Carolina, April 4–5, 2009.
8. “Approximating PDEs in L1”, Ninth International Meeting on Approximation Theory of the University of Jaen, Ubeda, Spain, June 28 – July 2, 2008.
9. “Approximating PDEs in L1”, Fourth Conference on Numerical Analysis and Applications, Lozenetz, Bulgaria, June 16–20, 2008.
10. “Second order schemes and entropy”, HYP2008, 12th International Conference on Hyperbolic Problems; Theory, Numerics, Applications, College Park, USA, June 9–13, 2008.
11. “Approximating PDEs in L1”, Nonlinear Approximation Techniques Using L1, College Station, Texas, USA, May 16–18, 2008.
12. “Approximation of first order PDEs in L1”, Wavelets and Multiscale Methods, July 29 – August 4, 2007, Oberwolfach, Germany.
13. “L1-based approximations of PDEs”, Nonlinear Methods in Computational Mathematics, the Summer Meeting of the Canadian Mathematical Society, June 2007, Winnipeg, Canada.
14. “L1-approximation of stationary Hamilton-Jacobi equations”, 12th International Conference in Approximation Theory, San Antonio, Texas, March 2007.
15. “Numerical approximations of first order hyperbolic PDEs”, Sixth International Conference on Numerical Methods and Applications, NM&A’06, Borovets, Bulgaria, August 2006.
16. “ $L_1$  approximations of Hamilton-Jacobi equations”, Eleventh International Conference on Hyperbolic Problems; Theory, Numerics, Applications, Lyon, France, July 2006.
17. “Approximation of first order PDEs in  $L_1$ ”, invited minisimposium talk, Modeling and Numerics of Complex Flows, ECMI 2006, Madrid, Spain, July 2006.
18. “Approximation of first order PDEs in  $L_1$ ”, invited talk, Pioneers Of Bulgarian Mathematics, International Conference, Sofia, July 8–10, 2006, Dedicated to Nikola Obrechhoff and Lubomir Tschakaloff.
19. “Approximation of first order PDEs in  $L_1$ ”, Texas Finite Element Rodeo, College Station, Texas, March 2006.
20. “Numerical stability, convergence and error estimates for non-oscillatory schemes”, Tenth International Conference on Hyperbolic Problems Theory, Numerics, Applications, Osaka, Japan, September 2004.
21. “Minmod-type schemes for scalar conservation laws”, Texas Finite Element Rodeo, Houston, Texas, March 2003.

22. “Entropic schemes for scalar conservation laws”, Center for Approximation Theory Annual Symposium, Spring 2002.
23. “Non-oscillatory Schemes for Scalar Conservation Laws”, Ninth International Conference on Hyperbolic Problems Theory, Numerics, Applications, Pasadena, California, March 2002.
24. “Entropic and Relaxed Entropic Schemes for Conservation Laws”, Special Session on Approximation and Wavelets, AMS Meeting 963, Southeastern Section, Columbia, SC, March 2001.
25. “Weakly Non-Oscillatory Schemes for Scalar Conservation Laws”, Trends in Approximation Theory, AMS Meeting 960 Birmingham, Alabama, November 2000.
26. “Convergence Theory for Scalar Conservation laws”, invited talk, Hyperbolic Conservation Laws, Oberwolfach, Germany, October 2000.
27. “Linear Transport Equations with Continuous Solutions”, Trends in Approximation Theory, Nashville, Tennessee, May 1999.
28. “Linear Transport Equations with Discontinuous Coefficients”, 7th International Conference on Hyperbolic Problems, ETH Zürich, Switzerland, February 1998.
29. “Convexity Preserving Approximation in  $L_1$ ”, Southeast Conference in Approximation Theory, Nashville, Tennessee, November 1994.

### **Selected seminars and colloquium talks**

1. “Entropy viscosity”, Los Alamos National Laboratories, February 2010.
2. “Entropy viscosity methods for nonlinear conservation laws”, Approximation Theory Seminar, TAMU, December 2009.
3. “Approximating PDEs in  $L_1$ ”, North Carolina State University, April 2009.
4. “Entropy viscosity”, Sandia National Laboratories, December 2009.
5. “Entropy viscosity”, ExxonMobil Upstream Research Company, Houston, Texas, May 2009.
6. “Entropy methods in nonlinear PDEs”, Georgia Tech, November 2008.
7. “Approximating PDEs in  $L_1$ ”, Tulane University, October 2008.
8. “Second order schemes and entropy”, Texas A&M, October 2007.
9. “ $L_1$ -approximation of Hamilton-Jacobi equations”, University of South Carolina, September 2007.
10. Invited talk at the workshop “Wavelet and Multiscale Methods”, July 29th - August 4th, 2007, Oberwolfach, Germany.
11. “Nonoscillatory Central Schemes on Unstructured Meshes and Applications”, Exxon-Mobil Upstream Research Company, Houston, Texas, April 2007.

## Publications

### In refereed journals

1. P. PARVANOV AND B. POPOV, *The Limit Case of Bernstein's Operators with Jacobi Weights*, *Mathematica Balkanica, New Series*, **8** (1994), Fasc.2–3, 165–177.
2. K. IVANOV AND B. POPOV, *On Convex Approximation by Quadratic Splines*, *J. Approx. Theory*, **85** (1996), 110–114.
3. G. PETROVA AND B. POPOV, *Linear Transport Equations with Discontinuous Coefficients*, *Comm. PDEs*, **24** (1999), 1849–1873.
4. G. PETROVA AND B. POPOV, *Linear Transport Equations with  $\mu$ -monotone Coefficients*, *J. Math. Anal. and Appl.*, **260** (2001), 307–324.
5. K. KOPOTUN, M. NEAMTU AND B. POPOV, *Weakly Non-Oscillatory Schemes for Scalar Conservation Laws*, *Math. Comp.*, **72** (2003), 1747–1767.
6. S. KONYAGIN, B. POPOV AND O. TRIFONOV, *On Convergence of Minmod-Type Schemes*, *SIAM Journal on Numerical Analysis*, **42** (2005), 1978–1997.
7. JIANGGUO LIU, BOJAN POPOV, HONG WANG, AND RICHARD E. EWING, *Convergence Analysis of Wavelet Schemes for Convection-Reaction Equations under Minimal Regularity Assumptions*, *SIAM Journal on Numerical Analysis*, **43** (2005), 521–539.
8. Y. EFENDIEV AND B. POPOV, *On Homogenization of Nonlinear Hyperbolic Equations*, *Communications on Pure and Applied Analysis*, **4** (2005), 297–311.
9. B. POPOV AND O. TRIFONOV, *Order of convergence of minmod-type schemes*, *Math. Comp.*, **75** (2006), 1735–1753.
10. B. POPOV AND O. TRIFONOV, *One-sided stability and convergence of the Nessyahu-Tadmor scheme*, *Numer. Math.*, **104** (2006), 539–559.
11. J.-L. GUERMOND AND B. POPOV, *Linear advection with ill-posed boundary conditions via  $L^1$ -minimization*, *International Journal of Numerical Analysis & Modeling*, **4** (2007), 39–47.
12. A. KURGANOV, G. PETROVA AND B. POPOV, *Adaptive Semi-discrete Central-upwind Schemes*, *SIAM J. Sci. Comput.*, **29** (2007), 2381–2401.
13. J.-L. GUERMOND, FABIEN MARPEAU AND B. POPOV,  *$L^1$ -minimization algorithms for Hamilton-Jacobi equations*, *Communications in Mathematical Sciences*, **6** (2008), 199–216.
14. J.-L. GUERMOND AND B. POPOV,  *$L^1$ -minimization methods for Hamilton-Jacobi equations: the one-dimensional case*, *Numerische Mathematics*, **109** (2008), 269–284.
15. I. CHRISTOV AND B. POPOV, *New nonoscillatory central schemes on unstructured triangulations for hyperbolic systems of conservation laws*, *Journal of Computational Physics*, **227** (2008), 5736–5757.

16. J.-L. GUERMOND AND B. POPOV,  *$L^1$ -approximation of stationary Hamilton-Jacobi equations*, SIAM Journal on Numerical Analysis **47** (2008/2009), 339–362.
17. J.-L. GUERMOND AND B. POPOV, *An optimal  $L^1$ -minimization algorithm for stationary Hamilton-Jacobi equations*, Communications in Mathematical Sciences, **7** (2009), 211–238.
18. K. KOPOTUN AND B. POPOV, *Moduli of Smoothness of Splines and Applications in Constrained Approximation*, Jaen Journal on Approximation, vol. 2, no. 1, (2010), 77–89.
19. V. DOBREV, J.-L. GUERMOND AND B. POPOV, *Surface reconstruction and image enhancement via L1-minimization*, SIAM J. Sci. Comput., **32** (2010), 1591–1616.
20. J.-L. GUERMOND, R. PASQUETTI, AND B. POPOV, *Entropy viscosity method for nonlinear conservation laws*, Journal of Computational Physics, **230** (2011), 4248–4267.
21. O. MEHMETOGLU AND B. POPOV, *Maximum principle and convergence of central schemes based on slope limiters*, Math. Comp., **81** (2012), 219–231.

#### In refereed proceedings

1. I. CHRISTOV, I. MISHEV, AND B. POPOV, *Finite Volume Methods on Unstructured Voronoi Meshes for Hyperbolic Conservation Laws*, Proceedings of the 12th International Conference held in University of Maryland, June 2008 (E. Tadmor, J.-G. Liu and A. Tzavaras, eds.), AMS Proc. Symp. Applied Math., 67(2) (2009), 507–517.
2. B. POPOV AND P. POPOV, *A second order central scheme for Hamilton-Jacobi equations on triangular grids*, NAA'08, LNCS 5434, (2009), 447–485.
3. V. DOBREV, J.-L. GUERMOND AND B. POPOV *Surface reconstruction via  $L_1$  minimization*, NAA'08, LNCS 5434, (2009), 32–43.
4. O. MEHMETOGLU AND B. POPOV, *Maximum principle of central schemes with  $k$ -monotone fluxes*, Hyperbolic problems: theory, numerics and applications, HYP2010, to appear.
5. J.-L. GUERMOND, R. PASQUETTI AND B. POPOV *From suitable weak solutions to entropy viscosity*, Quality and Reliability of Larde-Eddy Simulations II, ERCOFTAC Series, Editor M. Salvetti, **3** (2010), 373–390, Springer, Berlin.
6. J.-L. GUERMOND, R. PASQUETTI, AND B. POPOV, *Entropy viscosity for conservation equations*, Proceedings of the V European Conference on Computational Fluid Dynamics ECCOMAS CFD 2010 J. C. F. Pereira, A. Sequeira and J. M. C. Pereira (Eds) Lisbon, Portugal, 14–17 June 2010 ISBN: 978-989-96778-1-4.

#### Accepted papers in refereed journals

1. J.-L. GUERMOND, R. PASQUETTI, AND B. POPOV, *From Suitable Weak Solutions to Entropy Viscosity*, Journal of Scientific Computing (2011), online DOI 10.1007/s10915-010-9445-3.

## Service

1. Refereed for many journals including: Mathematics of Computation, Advances in Computational Mathematics, SIAM Journal on Numerical Analysis, Journal of Approximation Theory, Numerische Mathematik, Journal of Mathematical Analysis and Applications, Applied Composite Materials, SIAM Journal on Mathematical Analysis.
2. Reviewed grant proposals for University of Cyprus in 2010 and for the Army Research Office in 2011.
3. Served on M.S. and Ph.D. committees in the Department of Mathematics, Department of Computer Science, Department of Statistics.
4. Ph.D. committee chair for Orhan Mehmetoglu, a Ph.D. student in Math. Dept. since 2007 and Vladimir Tomov, a Ph.D. student in Math. Dept. since 2009.
5. Ran a weakly nonlinear PDE seminar in Fall 2009 for graduate students interested in the subject.
6. Developed a new graduate course about nonlinear hyperbolic conservation laws: listed in the catalog as Math 638 from Fall 2011.
7. Worked with and partially supported (from NSF grants) three postdocs at the Department of Mathematics.
8. Wrote the Best Student Exam for the Texas A&M High School Contest in 2008, 2009, and 2010.
9. Participated in the grading of the Power team exam in the Texas A&M High School Contest in 2008–11 and organized (with Peter Howard) Math Mini Fair 2011.
10. Organized, with Ronald DeVore, Vladimir Koltchinskii, Francis Narcowich, Guergana Petrova, Steve Smale, Joe Ward, and Joel Zinn, “Approximation and learning in High Dimensions”, October 19-21, 2007, at Texas A&M.
11. Organized, with Ronald DeVore and Jean-Luc Guermond, “Nonlinear approximation techniques using L1 minimization”, May 16-18, 2008, at Texas A&M.
12. A member of the Executive and Graduate Studies Committees.