Curriculum Vitae
Jeffrey W. Banks

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Education:

5/2006	Ph.D.	Applied Mathematics	Rensselaer Polytechnic Institute
12/2002	M.S.	Mathematics	Rensselaer Polytechnic Institute
5/2002	B.S.	Mathematics of Computation	Rensselaer Polytechnic Institute

Appointments:

10/2009 – present	Technical Staff	Center for Applied Scientific Computing Lawrence Livermore National Laboratory
2/2008 – 10/2009	Post-Doctorate	Center for Applied Scientific Computing Lawrence Livermore National Laboratory
8/2007 – 12/2007	Instructor	Department of Mathematics and Statistics University of New Mexico
6/2006 – 2/2008	Post-Doctorate	Computational Sciences Research Institute Sandia National Laboratory
9/2005 – 6/2006	Research Assistant	Department of Mathematical Sciences Rensselaer Polytechnic Institute
5/2005 – 9/2005 5/2004 – 9/2004	Summer Intern	Institute for Scientific Computing Research Lawrence Livermore National Laboratory
9/2003 – 5/2005	VIGRE Fellow	Department of Mathematical Sciences Rensselaer Polytechnic Institute
9/2002 – 5/2003	RPI Fellow	Department of Mathematical Sciences Rensselaer Polytechnic Institute

Awards:

2012	*Presidential Early Career Award for Scientists and Engineers (PECASE)*	National Nuclear Security Administration	$250K
2006	*Joaquin B. Diaz Prize*	Rensselaer Polytechnic Institute	$500
2002	*Max Hirsch Prize*	Rensselaer Polytechnic Institute	$200

Grants: (PI = principle investigator, SR = senior researcher)

2014	*Domain-Adaptive High-order Accurate Algorithms for PDEs in Moving Geometry*	Department of Energy Office of Science	PI	$300K
2014	*High-Order Discretization Capabilities*	Lawrence Livermore National Laboratory	PI	$50K
2014	*Theory and Simulation of Large-Amplitude Electron Plasma and Ion Acoustic Waves*	Lawrence Livermore National Laboratory Institutional Computing Grand Challenge	SR	5M CPU hr
2013	*Advanced Multi-Domain Coupling*	Department of Defense Joint Munitions Program	PI	$100K/yr 2 years
2013	*Verification and Validation and Uncertainty Quantification*	Department of Energy Advanced Simulation and Computing	SR	$500K
2012	*Domain-Adaptive High-order Accurate Algorithms for PDEs in Moving Geometry*	Department of Energy Office of Science	SR	$275K
2011	*Theory and Simulation of Large-Amplitude Electron Plasma and Ion Acoustic Waves*	Lawrence Livermore National Laboratory Laboratory Directed R&D	SR	$630K/yr 3 years
2011	*Advanced Multi-Domain Coupling*	Department of Defense Joint Munitions Program	PI	$200K/yr 2 years
2010	*Domain-Adaptive High-order Accurate Algorithms for PDEs in Moving Geometry*	Department of Energy Office of Science	SR	$375K/yr 2 years
2010	*The Advance of Uncertainty Quantification Science*	Lawrence Livermore National Laboratory Laboratory Directed R&D	SR	$1.9M/yr 3 years

Refereed Publications:

2013
1. *Kinetic Simulations of the Self Focusing and Dissipation of Finite-Width Electron Plasma Waves*, B. J. Winjum, R. L. Berger, T. Chapman, J. W. Banks, and S. Brunner, Volume 111, Pages 105002, Phys. Rev. Lett.
2. *A Note on the Convergence of Godunov Type Methods for Shock Reflection Problems*, J. W. Banks, Volume 66, Number 1, Pages 19–23, Comput. Math. Appl.
3. *Richardson Extrapolation and Linearly Degenerate Discontinuities*, J. W. Banks and T. D. Aslam, Volume 57, Number 1, Pages 1–18, J. Sci. Comput.
4. *A Posteriori Error Estimation via Nonlinear Error Transport with Application to Shallow Water*, J. W. Banks, J. A. F. Hittinger, J. M. Connors, and C. S. Woodward, in Recent Advances in Scientific Computing and Applications, Contemporary Mathematics, Volume 586, Pages 35–42, Amer. Math. Soc., Providence, RI
5. *A Stable FSI Algorithm for Light Rigid Bodies in Compressible Flow*, J. W. Banks, W. D. Henshaw, and B. Sjögreen, Volume 245, Pages 399–430, J. Comput. Phys.
6. *A Method to Calculate Numerical Errors Using Adjoint Error Estimation for Linear Advection*, J. M. Connors, J. W. Banks, J. A. F. Hittinger, and C. S. Woodward, Volume 51, Number 2, Pages 894–926, SIAM J. Numer. Anal.
7. *Block-Structured Adaptive Mesh Refinement Algorithms for Vlasov Simulation*, J. A. F. Hittinger and J. W. Banks, Volume 241, Pages 118–140, J. Comput. Phys.
8. *Stability of Finite Difference Discretizations of Multi-Physics Interface Conditions*, B. Sjögreen and J. W. Banks, Volume 13, Number 2, Pages 386–410, Commun. Comput. Phys.

2012
9. *Threshold for Electron Trapping Nonlinearity in Langmuir Waves*, D. J. Strozzi, E. A. Williams, H. A. Rose, D. E. Hinkel, A. B. Langdon, and J. W. Banks, Volume 19, Number 11, Pages 112306, Phys. Plasmas
10. *Numerical Methods for Solid Mechanics on Overlapping Grids: Linear Elasticity*, D. Appelö, J. W. Banks, W. D. Henshaw, and D. W. Schwendeman, Volume 231, Issue 18, Pages 6012–6050, J. Comput. Phys.
11. *Upwind Schemes for the Wave Equation in Second-Order Form*, J. W. Banks and W. D. Henshaw, Volume 231, Issue 17, Pages 5854–5889, J. Comput. Phys.
12. *Deforming Composite Grids for Solving Fluid Structure Problems*, J. W. Banks, W. D. Henshaw, and D. W. Schwendeman, Volume 231, Issue 9, Pages 3518–3547, J. Comput. Phys.
13. *Numerical Error Estimation for Nonlinear Hyperbolic PDEs via Nonlinear Error Transport*, J. W. Banks, J. A. F. Hittinger, J. M. Connors, and C. S. Woodward, Volume 213–216, Pages 1–15, Comput. Method. Appl. Mech. Engrg.

2011
14. *A Normal Mode Stability Analysis of Numerical Interface Conditions for Fluid/Structure Interaction*, J. W. Banks and B. Sjögreen, Volume 10, Number 2, Pages 279–304, Commun. Comput. Phys.
15. *Two-Dimensional Vlasov Simulation of Electron Plasma Wave Trapping, Wavefront Bowing, Self-Focusing, and Sideloss*, J. W. Banks, R. L. Berger, S. Brunner, B. I. Cohen, and J. A. F. Hittinger, Volume 18, Number 5, Pages 052102, Phys. Plasmas
16. *A Note on Compressive Limiting for Two-Material Flows*, J. W. Banks, Volume 65, Issue 5, Pages 602–608, Int. J. Numer. Meth. Fl.

2010
17. *Towards a Scalable Fully-Implicit Fully-coupled Resistive MHD Formulation with Stabilized FE Methods*, J. N. Shadid, R. P. Pawlowski, J. W. Banks, L. Chacón, P. T. Lin, and R. S. Tuminaro, Volume 229, Issue 20, Pages 7649–7671, J. Comput. Phys.
18. *A New Class of Non-Linear, Finite-Volume Methods for Vlasov Simulation*, J. W. Banks and J. A. F. Hittinger, Volume 38, Issue 9, Pages 2198–2207, IEEE T. Plasma Sci.
19. *On Exact Conservation for the Euler Equations with Complex Equations of State*, J. W. Banks, Volume 8, Number 5, Pages 995–1015, Commun. Comput. Phys.

2009
20. *An Evaluation of the FCT Method for High-Speed Flows on Structured Overlapping Grids*, J. W. Banks, W. D. Henshaw, and J. N. Shadid, Volume 228, Issue 15, Pages 5349–5369, J. Comput. Phys.
21. *An Euler System Source Term that Develops Prototype Z-pinch Implosions Intended for the Evaluation of Shock-Hydro Methods*, J. W. Banks and J. N. Shadid, Volume 61, Issue 7, Pages 725–751, Int. J. Numer. Meth. Fl.

2008
22. *A Study of Detonation Propagation and Diffraction with Compliant Confinement*, J. W. Banks, W. D. Henshaw, D. W. Schwendeman, and A. K. Kapila, Volume 12, Number 4, Pages 769–808, Combust. Theor. Model.
23. *On Sub-linear Convergence for Linearly Degenerate Waves in Capturing Schemes*, J. W. Banks, T. Aslam and W. J. Rider, Volume 227, Issue 14, Pages 6985–7002, J. Comput. Phys.

2007
24. *A High-Resolution Godunov Method for Compressible Multi-Material Flows on Overlapping Grids*, J. W. Banks, D. W. Schwendeman, A. K. Kapila, and W. D. Henshaw, Volume 223, Issue 1, Pages 262–297, J. Comput. Phys.

Teaching Activity:

2013 (Summer)	*A Crash Course in Numerical Analysis*	Center for Applied Scientific Computing Lawrence Livermore National Laboratory
2007 (Fall)	*Introduction to Numerical Computing*	Department of Mathematics and Statistics University of New Mexico
2003 (Summer)	*Numerical Computing*	Department of Mathematical Sciences Rensselaer Polytechnic Institute

Student Visitors:

2013	Geoffrey Main	currently a Ph.D. student at Stanford University
2013	Kevin Briggs	currently an M.S. student at University of Utah
2010	David Seal	currently a postdoc at Michigan State University

Postdocs:

2012 – present	Thomas Chapman	currently a postdoc at LLNL
2010 – 2013	Jeffrey Connors	currently an assistant professor at University of Connecticut

Talks:

2013 ·*Overcoming Added-Mass Instabilities for Fluid-Structure Interaction*, Dartmouth College, Hanover, NH

·*The Design and Development of Modular and Adaptive Algorithms and Software*, Exascale Mathematics Working Group, Washington, DC

·*Stable Partitioned Solvers for Compressible Fluid-Structure Interaction Problems*, Oak Ridge National Laboratory, Oak Ridge, Tennessee

·*Upwind Methods for Second-Order Wave Equations*, SIAM Conference on Computational Science and Engineering, Boston, Massachusetts

·*Upwind Methods for Wave Equations in Second-Order Form*, Finite Elements in Fluids, San Diego, California

2012 ·*Overcoming the Added-Mass Instability in Compressible Fluid-Structure Interaction*, Applied Mathematics Seminar, University of Delaware, Newark, Delaware

·*Tests for Collisionless Electrostatic Codes*, Algorithm and Model Verification and Validation for Kinetic Plasma Simulation Codes, East Lansing, Michigan

·*Overcoming the Added-Mass Instability in Compressible Fluid-Structure Interaction*, Mathematical Sciences Colloquium, Rensselaer Polytechnic Institute, Troy, New York

·*Overcoming the Added-Mass Instability in Compressible Fluid-Structure Interaction*, 11th Symposium on Overset Composite Grids and Solution Technology, Dayton, Ohio

·*A Posteriori Error Estimation via Nonlinear Error Transport*, Scientific Computing and Applications, Las Vegas, Nevada

2011 ·*Deforming Composite Grids for Fluid-Structure Interaction: Overcoming the Added-Mass Instability for Compressible Fluids and Elastic Solids*, ASCR Applied Mathematics Research Principal Investigators Meeting, Reston, VA

·*High-Order Numerical Simulation of Vlasov Systems for Laser Plasma Interaction*, SIAM Conference on Analysis of Partial Differential Equations, San Diego, California

·*Algorithms for Linear Elasticity on Overlapping Grids*, SIAM Computational Science and Engineering, Reno, Nevada

·*A Posteriori Error Estimation via Error Transport*, SIAM Computational Science and Engineering, Reno, Nevada

2010 ·*Numerical Methods for Solid Mechanics on Overlapping Grids*, 10th Symposium on Overset Composite Grids and Solution Technology, Mountain View, California

2009 ·*High-Order and Adaptive Methods for Laser-Plasma Interaction Problems*, University of Wisconsin Applied Math and PDE Seminar, Madison, Wisconsin

·*Adaptive and High-Order Methods for Laser-Plasma Interaction Problems*, IMACS World Congress on Computational and Applied Mathematics and Applications in Science and Engineering, Athens, Georgia

·*Deforming Composite Grids for Multi-Physics Modeling*, SIAM Annual Meeting, Denver, Colorado

·*Multiphysics Modeling of High Explosives*, Bay Area Scientific Computing Day, Berkeley, California

·*Multi-Physics Modeling of High Explosives*, SIAM Computational Science and Engineering, Miami, Florida

·*Adaptive Numerical Methods for Multi-Material Flows with Applications to High Explosives*, Finite Elements in Flow Problems, Tokyo, Japan

2008 ·*Desensitized Heterogeneous Explosives and Compliant Confinement*, ASCR Applied Mathematics Research Principal Investigators Meeting, Argonne, Illinois

·*An Evaluation of the FCT Method for High-Speed Flows on Overlapping Grids*, 9th Symposium on Overset Composite Grids and Solution Technology, State College, Pennsylvania

·*An Adaptive Numerical Method for Compliant Confinement in Shock Desensitized High Explosives*, SIAM International Conference on Numerical Combustion, Monterey, California

·*Some Outstanding Concerns with Shock Capturing*, SIAM Annual Meeting, San Diego, California

2007 ·*Dynamic Detonation Failure in Charges of High Explosive*, International Colloquium on the Dynamics of Explosions and Reactive Systems, Poitiers, France

·*Simulations of Compliantly Confined, Shock-Desensitized High Explosives*, SIAM International Congress on Industrial and Applied Mathematics, Zurich, Switzerland

·*FCT Algorithms for the Euler Equations on Overlapping Grids*, SIAM Computational Science and Engineering, Costa Mesa, California

·*High-Speed Flow Solvers for Overlapping Grids*, AMS Special Session on Mathematical and Computational Aspects of Compressible Flow Problems, Albuquerque, New Mexico

·*An Overlapping Grid Implementation of Flux-Corrected-Transport for High-Speed Flows*, RPI Mathematical Sciences Colloquium, Troy, New York

·*Explosives, High Speed Aircraft and Shock Waves: Challenging Problems for Computational Science*, Computational Science Training in the Mathematical Sciences at Rensselaer, Troy, New York

2006 ·*Shock Capturing for High-Speed Multi-Material Flows on Overlapping Grids*, 8th Symposium on Overset Composite Grids and Solution Technology, Houston, Texas

·*Compliant Confinement of Condensed Phase Explosives*, SIAM International Conference on Numerical Combustion, Granada, Spain

·*FCT Algorithms for the Euler Equations on Overset Grids*, Applied Mathematics Colloquium, University of New Mexico, Albuquerque, New Mexico

·*A Shock Capturing Scheme for High-Speed Inert and Reactive Multi-Material Flows on Overlapping Grids*, Courant Institute Numerical Analysis and Scientific Computing Seminar, New York City, New York

2005 ·*Corner Turning in Condensed Phase Explosives with Compliant Boundaries*, RPI Graduate Student Series, Troy, New York

·*Numerical Studies of Detonation Diffraction with Compliant Boundaries*, LANL Energetic Materials Meeting, Los Alamos, New Mexico

2004 ·*Multi-Fluid Flows on Overset Grids using a Godunov Approach*, RPI Graduate Student Series, Troy, New York

Poster Presentations:

2013 ·*Efficient Simulation of 2+2-D Multi-Species Plasma Waves Using an Eulerian Vlasov Code*, 55th Annual Meeting of the APS Division of Plasma Physics, Denver, Colorado

·*Steady Electron Plasma Waves in 2D+2V*, Anomalous Absorption, Stevenson, Washington

2012 ·*Vlasov Simulations of the Filamentation and Trapped Electron Sideband Instability*, Anomalous Absorption, Key West, Florida

2011 ·*High-Order Eulerian-Based Vlasov Simulation for LPI in 1+1 and 2+2 -Dimensions*, International Conference on Numerical Simulations of Plasmas, Long Branch, New Jersey

2010 ·*Beyond 1D: Algorithmic Advances for More Tractable Vlasov Simulation*, Anomalous Absorption, Aspen, Colorado

·*Numerical Methods for Solid Mechanics on Overlapping Grids*, ASCR Applied Mathematics Research Principal Investigators Meeting, Berkeley, California

·*Deforming Composite Grids for Fluid-Structure Interactions*, ASCR Applied Mathematics Research Principal Investigators Meeting, Berkeley, California

·*Dynamics of Deformable Interfaces*, ASCR Applied Mathematics Research Principal Investigators Meeting, Berkeley, California

2009 ·*VALHALLA: An Adaptive Continuum Vlasov Code for Laser-Plasma Interaction*, Anomalous Absorption, Bodega Bay, California

2007 ·*Comparison of Flux-Corrected-Transport and High-Resolution Godunov Methods on Overlapping Grids*, ASCR Applied Mathematics Research Principal Investigators Meeting, Livermore, California

2005 ·*Reactive High-Speed Multi-Fluid Flows*, ISCR Poster Symposium, Livermore, California

2004 ·*High-Speed Multi-Component Flows*, ISCR Poster Symposium, Livermore, California