

Curriculum Vita for Dinshaw S. Balsara

Address and Telephone Number

Physics Department
Office # 333h
College of Science
University of Notre Dame
225 Nieuwland Science Hall
Notre Dame, IN 46556-5670

(574) 631-9639 (574) 631-5952 (fax)

Email: dbalsara@nd.edu

Websites:

<http://physics.nd.edu/people/faculty/dinshaw-balsara/>

<http://www.nd.edu/~dbalsara/Numerical-PDE-Course>

Google Scholar Profile : <http://scholar.google.com/citations?user=k6UU5egAAAAJ&hl=en>

Education

- Ph.D. 1990 University of Illinois at Urbana-Champaign
- M.S. 1989 (Astronomy) University of Chicago
- M.S. 1982 (Physics) Indian Institute of Technology, Kanpur
- H.S.C. 1977 Jai Hind College, Bombay

Employment

- Nov. 1990 - Oct. 1993: Postdoctoral Fellow, Physics and Astronomy Department, Johns Hopkins University
- Nov. 1993 - Jan. 1994: Postdoctoral Fellow, National Center for Supercomputing Applications, University of Illinois at Urbana-Champaign
- Jan. 1994 - Oct. 1997: Visiting Research Scientist, National Center for Supercomputing Applications, University of Illinois at Urbana-Champaign
- Oct. 1997 - Aug 2001: Research Scientist, National Center for Supercomputing Applications, University of Illinois at Urbana-Champaign
- Aug. 2001 – Sept. 2007 : Assistant Professor, Physics Department, Univ. of Notre Dame
- Sept. 2007 –2018 : Associate Professor, Physics Department, Univ. of Notre Dame
- Nov. 2010 –2018 : Concurrent Associate Professor, Applied Math Department, Univ. of Notre Dame

- Oct. 2014 – Sept. 2015: Visiting Professor, University of Nice, Sophia-Antipolis
- May 2018 -- : Professor, Physics Department, Univ. of Notre Dame
- May 2018 -- : Concurrent Professor, Applied Math Department, Univ. of Notre Dame

Editorial Duties

Associate Editor, Journal of Computational Physics

Associate Editor, Computational Astrophysics and Cosmology

Awards and Honors

- 2017 GIAN (Global Initiative on Academic Networks) Award from the Govt. of India
- 2014 Department of Energy Award of Excellence for significant contributions to the Stockpile Stewardship Program
- 1982 Best Student in Physics Award, Indian Institute of Technology
- 1982 M.S. with honors, Indian Institute of Technology, Kanpur
- 1977 H.S.C. with honors, Jai Hind College

Workshops Organized

2016 Invited Lecturer, Summer School in Computational Physics in Moscow

2016 Les Houches Summer School on Computational Astrophysics (<https://comp-phys-2016.sciencesconf.org/>)

2017 GIAN (Global Initiative on Academic Networks) lectures at IIT Delhi, one of India's premiere STEM institutes (<https://hkkaushik.wordpress.com/gian/>)

Brief Biographical Description

I have a dual training in physics and astrophysics. My Ph.D. was in computational physics and astrophysics where I designed and compared several popular schemes for astrophysical fluid dynamics and also applied them to the study of extragalactic jets. I subsequently worked on several problems in active galactic nuclei, studying the accretion on to central engines, starburst galaxies and galaxies in clusters. More recently, I have developed computational applications in the areas of interstellar medium, turbulence, star formation, planet formation, the physics of accretion disks, compact objects and relativistic astrophysics and I continue to work in all of those areas of research.

I have also played a seminal role in formulating our modern conception of computational astrophysics. My work on divergence-free AMR-MHD has led me to break new ground in our understanding of numerical MHD. Seminal contributions have also been made in higher order

methods for hyperbolic PDEs. I have written several leading papers on how to achieve high spatial accuracy via WENO, DG and PNPM schemes. I have also played an important role in the development of ADER time update strategies with very high order of temporal accuracy. Recently, I have played a leading role in formulating multidimensional Riemann solvers and showing their utility for MHD simulations as well as ALE simulations. I have also produced some of the best, most accurate and most robust methods for numerical MHD and have recently begun extending this expertise to radiative transfer as well as non-ideal processes that are often very useful in regulating astrophysical phenomena. I also have a scholarly interest in high performance computing, especially at the PetaScale and ExaScale levels. Several of my papers have been cited over a hundred times and quite a few have been cited many hundreds of times. I serve the computational physics community via my editorial duties for the Journal of Computational Physics. I also serve the computational astrophysics community via my editorial duties for Computational Astrophysics and Cosmology.

I have taught at the prestigious Les Houches summer school in Computational Astrophysics. This winter I will be giving the GIAN (Global Initiative on Academic Networks) lectures at IIT Delhi, one of India's premiere STEM institutes. My group is also one of ~40 groups selected nationwide to compute on the PetaScale Blue Waters system.

The above-mentioned numerical expertise is routinely applied to problems in all areas of computational astrophysics. In fact, the robust numerics was central to the process of carrying out path-breaking simulations of the supernova explosion-driven ISM turbulence. That work has resulted in many new insights into the nature of the multi-phase ISM and the evolution of magnetic fields in it. Novel insights have also been recently gained on the physics of accretion disk boundary layers and the physics of supernova remnants in the presence of anisotropic thermal conduction. The work has also been applied to star formation and planet formation studies, astrophysical jets and to the study of turbulence in general.

Professional and Academic Societies

The American Astronomical Society

Service to the Community

- Referee for Astrophysical Journal
- Referee for Monthly Notices of the Royal Astronomical Society
- Referee for Astronomy & Astrophysics
- Referee for Journal of Computational Physics
- Referee for SIAM Journal of Applied Mathematics
- Referee for Physics of Plasmas
- Referee for Physical Review
- Reviewer for National Science Foundation
- Reviewer for NASA
- Reviewer for U.S. Department of Energy

- Reviewer for Canadian NSERC
- US-Israel Binational Science Foundation
- Indo-US Interdisciplinary Grants
- Israel-US Bilateral Research Grants
- Participated in a blue ribbon panel that was tasked with writing the **NSF's roadmap for ExaScale Computing** by 2022

Contributions to Technological Leadership of the US:

My group is also one of ~40 groups selected nationwide to compute via a PRAC grant on the PetaScale Blue Waters system.

Participated in a blue ribbon panel that was tasked with writing the **NSF's roadmap for ExaScale Computing** by 2022.

Invited Talks

- January 1996, Workshop on Active Galactic Nuclei, "On The Role of Relativistic Hydrodynamic Simulations in AGN Research"
- February 1996, University of Washington, Seattle, "Modern-Day Schemes for Hyperbolic Systems on Modern MPP Machines".
- March 1996, Observatoire de Nice, France, "Modern-Day Schemes for Hyperbolic Systems on Modern MPP Machines".
- May 1996, Brown University, "Modern-Day Schemes for Hyperbolic Systems on Modern MPP Machines".
- August 1996, Los Alamos National Laboratory, "TVD and ENO Schemes for Magnetohydrodynamics on Modern MPP Machines".
- August 1996, Los Alamos National Laboratory, "Designing Robust ENO Schemes with Extremely High Order of Accuracy".
- October 1996, Halifax, Conf. on Computational Astrophysics, "TVD and ENO Schemes for Computational Astrophysics on Modern MPP Machines".
- October 1996, GSFC, "TVD and ENO Schemes for Computational Astrophysics on Modern MPP Machines".
- June 1997, Edinburgh, "The Role of Relativistic Jets in AGN Research".

- November 1997, JPL, Caltech, “TVD and ENO Schemes for Non-Relativistic and Relativistic Magnetohydrodynamics”.
- November 1997, Astrophysics, Caltech, “The Role of Relativistic Jets in AGN Research”.
- November 1997, Lawrence Livermore National Lab, “TVD and ENO Schemes for Computational Astrophysics on Modern MPP Machines”.
- November 1997, Supercomputing 97, “High Performance Fortran for Grid-based and Particle-based Applications”.
- February 1998, UIUC, Champaign-Urbana, “The Role of Relativistic Jets in AGN Research”.
- July 1998, Los Alamos, “Higher Order Godunov Schemes of Increasingly High Order of Accuracy”.
- August 1998, ICASE, NASA Langley, “Higher Order Godunov Schemes of Increasingly High Order of Accuracy”.
- October 1998, UIUC, Champaign-Urbana, “Higher Order Godunov Schemes of Increasingly High Order of Accuracy”.
- October 1998, NASA Ames, “Higher Order Godunov Schemes of Increasingly High Order of Accuracy”.
- November 1998, Argonne National Lab, “Higher Order Godunov Schemes of Increasingly High Order of Accuracy”.
- December 1998, Sandia National Lab, “Higher Order Godunov Schemes of Increasingly High Order of Accuracy”.
- November 1999, UIUC, Champaign-Urbana, “Innovative, Highly Parallel Adaptive Mesh Refinement”.
- March 2000, Brown University, “Innovative, Highly Parallel Adaptive Mesh Refinement”.
- April 2000, University of Houston, “Innovative, Highly Parallel Adaptive Mesh Refinement”.
- April 2000, UIUC, Champaign-Urbana, “Fast and Accurate Discrete Ordinates Methods for Multidimensional Radiative Transfer”.
- September 2000, University of Minnesota, “Simulating Fast Dynamos”.
- October 2000, University of Wisconsin, “Simulating Fast Dynamos”.

- October 2000, University of Michigan, “Fast and Accurate Discrete Ordinates Methods for Multidimensional Radiative Transfer”.
- October 2000, Max Planck Institute, Heidelberg, “Simulating Fast Dynamos”.
- October 2000, Max Planck Institute, Heidelberg, “Fast and Accurate Discrete Ordinates Methods for Multidimensional Radiative Transfer”.
- November 2000, Naval Research Laboratory, “Simulating Fast Dynamos”.
- February 2001, University of Notre Dame, Notre Dame, Indiana, “Simulating Fast Dynamos”.
- February 2001, University of Notre Dame, Notre Dame, Indiana, “Powers of Ten : A Multi-Scale, Physics-Rich View of Computational Astrophysics”.
- April 2001, Arizona State University, Tempe, Arizona, “Powers of Ten : A Multi-Scale, Physics-Rich View of Computational Astrophysics”.
- May 2001, University of Wisconsin, Madison, Wisconsin, “Fast and Accurate Discrete Ordinates Methods for Multidimensional Radiative Transfer”.
- May 2001, University of Wisconsin, Madison, Wisconsin, “Powers of Ten : A Multi-Scale, Physics-Rich View of Computational Astrophysics”.
- June 2001, Seoul Korea, “AMR-MHD Techniques in Computational Astrophysics”.
- June 2001, Seoul Korea, “Powers of Ten : A Multi-Scale, Physics-Rich View of Computational Astrophysics”.
- Conf. Of Computational Astrophysics, June 2001, Taejon Korea, Invited Talk: “Highly Parallel Structured Adaptive Mesh Refinement Using Parallel Language-Based Approaches”.
- Conf. Of Computational Astrophysics, June 2001, Taejon, Korea, Invited Talk: “Powers of Ten : A Multi-Scale, Physics-Rich View of Computational Astrophysics”.
- Conf. On Star Formation, July 2001, Paris, France, Conference Talk: “Powers of Ten : A Multi-Scale, Physics-Rich View of Computational Astrophysics”.
- October 2001, University of Kentucky, Lexington, Kentucky, Colloquium: “Fast and Accurate Discrete Ordinates Methods for Multidimensional Radiative Transfer”.
- October 2001, University of Kentucky, Lexington, Kentucky, Colloquium: “Powers of Ten : A Multi-Scale, Physics-Rich View of Computational Astrophysics”.
- HEDLA Conference, February 2002, University of Michigan, Ann Arbor, Invited Talk: “Fast and Accurate Discrete Ordinates Methods for Multidimensional Radiative Transfer”.

- Math Dept., March 2002, University of Notre Dame, Seminar: “Divergence-Free Adaptive Mesh Refinement for Magnetohydrodynamics”.
- Star Formation ‘02 Conference, 12th June 2002, Taiwan, Invited Talk: “Protostellar Core Collapse and Fragmentation Using AMR-MHD Simulations”.
- Workshop on Multidimensional Schemes, 18th June 2002, Bordeaux, France, Invited Talk: “Divergence-Free Adaptive Mesh Refinement for Magnetohydrodynamics”.
- IAU Symposium on Numerical Simulations in Astronomy, 5th July 2002, Tokyo, Invited Talk: “AMR-MHD in Computational Astrophysics”.
- 2nd annual IGPP Astrophysics Conference: Turbulence and the Interplanetary and Interstellar Medium, 9-12th February, Palm Springs, CA, Invited Talk: “Studying the Turbulent ISM with Supernova Explosions”.
- April 30, 2003, National Astronomical Observatory, Tokyo, Japan, Invited Talk: “Studying the Turbulent ISM with Supernova Explosions”.
- May 28, 2003, Kyoto University, Kyoto Japan, Invited Talk: “Divergence-Free Adaptive Mesh MHD and Some Resulting Schemes”
- May 30, 2003, Kyoto University, Kyoto Japan, Invited Talk: “Studying the Turbulent ISM with Supernova Explosions”.
- June 2, 2003, National Institute of Fusion Science, Gifu, Japan, Invited Talk: “Divergence-Free Adaptive Mesh MHD and Some Resulting Schemes”
- June 2, 2003, National Institute of Fusion Science, Gifu, Japan, Invited Talk: “Innovative, Highly Parallel Adaptive Mesh Refinement”.
- July 11, 2003, National Astronomical Observatory, Tokyo, Japan, Invited Talk: “Supernova Remnants and their Interaction with their Environment”.
- July 15, 2003, Kyoto University, Kyoto Japan, Invited Talk: “Supernova Remnants and their Interaction with their Environment”.
- Conference on Partial Differential Equations and their Applications, Aug. 14-17, 2003 at Notre Dame, Invited Talk: “AMR-MHD in Computational Astrophysics”.
- Aug, 27, 2003, Univ. of Notre Dame, Notre Dame, Invited Talk: “Supernova Remnants and their Interaction with their Environment”.
- Oct, 22, 2003, Univ. of California, Riverside, Invited Talk: “Supernova Remnants and their Interaction with their Environment”.

- Nov., 10, 2003, Univ. of Rochester, Invited Talk: “Supernova Remnants and their Interaction with their Environment”.
- Jan. 13, 2004, Korea, Conf. On “MHD Processes around Black Holes and their Observational Evidence”, Invited Talk: “Non-Relativistic and Relativistic Numerical MHD with Applications to Astrophysics”.
- HEDLA Conference, March 2004, Tucson, Arizona, Invited Talk : “Divergence-Free Techniques in MHD and AMR-MHD with Applications to Astrophysics”.
- June 22, 2004, ICOSAHOM’04, Brown University, Providence, RI, Invited Talk : “The Role of Higher Order Schemes in Non-Uniform Convergence of MHD Riemann Problems”.
- Oct. 11-15, 2004, Large-Scale Computation in Astrophysics, Cambridge University, England, Invited Talk: “Amplification of Interstellar Magnetic Fields by Supernova-Driven Turbulence”.
- Sept. 5-9, 2005, Astronomy with Radioactivities V, Clemson University, Invited Talk: “Simulating the Turbulent Mixing of Metals and Radioactivities in the ISM”.
- Nov. 30, 2005, Los Alamos National Lab. : “Turbulent Mixing and Magnetic Field Amplification in the ISM”.
- March 27-30, 2006, IGGP Conference, Numerical Modeling of Space Plasma Flows, Invited Talk: “Simulating the Turbulent Mixing of Metals and Radioactivities in the ISM”.
- March 27-30, 2006, IGGP Conference, Numerical Modeling of Space Plasma Flows, Invited Talk: “Anisotropic Thermal Conduction in Supernova Remnants”
- April, 19, 2006, University of Villanova, Invited Talk: “Simulating the Turbulent Mixing of Metals and Radioactivities in the ISM”.
- February, 27, 2007, Department of Aeronautical and Mechanical Engineering, Univ. of Notre Dame, Invited Talk : “Dust Sedimentation in Protoplanetary Disks”
- March 28, 2007, 2nd International Conference on Higher Order Non-Oscillatory Methods for Wave Propagation, Transport and Flow Problems, Trento, Italy, “RKDG and ADER-DG Schemes for Euler and MHD Flows in Astrophysics”
- April 16, 2007, CAM Colloquium, Department of Mathematics, Univ. of Notre Dame, Invited Talk : “RKDG and ADER-DG Schemes for Euler and MHD Flows in Astrophysics”
- June 11, 2007, ASTRONUM 2007 Conference, Paris, France, Invited Talk : “Dust Sedimentation in Protoplanetary Disks”
- June 22, 2007, ICOSAHOM07 Conference in Beijing, China, Invited Talk : “RKDG and ADER-DG Schemes for Euler and MHD Flows in Astrophysics”

- July 20, 2008, Univ. of Toledo, Midwest Conference on Star Formation, Invited Talk : “Dust Sedimentation in Protoplanetary Disks”
- January 2, 2009, Indian Institute of Technology, Kanpur, Invited Talk: “Dust Sedimentation in Protoplanetary Disks”
- January 2, 2009, Indian Institute of Technology, Kanpur, Invited Talk: “Introduction to Computational Astrophysics”
- January 26, 2009, Univ. of Wisconsin, Midwest Conference on Turbulence, Invited Talk: “Anisotropic Thermal Conduction in Supernova Remnants”
- February 19, 2009, Goddard Space Flight Center, Invited Talk : “Dust Sedimentation in Protoplanetary Disks”
- June 19-23, 2009, 10th US National Congress on Computational Mechanics, Invited Talk : “ADER-WENO Schemes for Euler Flows and Divergence-Free MHD”
- December 21-23, 2009, International Conference on Turbulence, Indian Institute of Technology, Kanpur, Invited Talk: “Turbulent Viscosity in Accretion Disks”
- April 21, 2010, Univ. of Wisconsin, Midwest Conference on Magnetic Fields in Astrophysics, Invited Talk, “Direct Evidence for Two-Fluid Effects in Molecular Clouds”.
- May 16-19, 2010, Core Collapse and Young Stellar Objects Conference, Univ. of Western Ontario, Invited Talk, “Dust Sedimentation in Protoplanetary Disks”.
- June 13-18, 2010, Astronom 10 Conference on Numerical Astrophysics, San Diego, Invited Talk, “Higher Order ADER-WENO Schemes for Space-Time Accurate Astrophysical Simulations”
- July 12-16, 2010, SIAM Annual Conference, Pittsburgh, Invited Talk, “Multidimensional Riemann Solvers with Applications to Hydrodynamics and Magnetohydrodynamics”.
- October 26, 2010, First Indiana Astrophysics Meeting, Purdue University, Invited Talk, “The Role of Thermal Conduction in the Evolution of Supernova Remnants and the ISM”.
- October 3-12, 2010, Workshop on Partially Ionized Plasmas, Huntsville Alabama, Invited Talk, “Direct Evidence for Two-Fluid Effects in Molecular Clouds”.
- April 11-15, 2011, European Workshop on High Order Nonlinear Numerical Methods for Evolutionary PDEs: Theory and Applications (HONOM 2011), Trento Italy, Invited Talk, “ADER-WENO Schemes for High Accuracy Simulation of Conservation Laws”.
- May 6, 2011, Midwest Magnetic Fields Workshop, Univ. of Wisconsin, Madison, Invited Talk, “New Paradigms in High Accuracy Numerical MHD”.

- June 13-17, 2011, Astronom 11 Conference on Numerical Astrophysics, Valencia, Spain, Invited Talk, “Higher Order ADER-WENO Schemes With Stiff Source Terms for Self-Adaptive Astrophysical Simulations”
- July 18-22, 2011, Seventh International Conference on Industrial and Applied Mathematics ICIAM 2001, Vancouver Canada, Invited Talk, “ADER-WENO Schemes for High Accuracy Simulation of Conservation Laws”.
- July 18-22, 2011, Seventh International Conference on Industrial and Applied Mathematics ICIAM 2001, Vancouver Canada, Invited Talk, “ADER-WENO Schemes for Simulating Conservation Laws with Stiff Source Terms”.
- April 4, 2012, Midwest Magnetic Fields Workshop, Univ. of Wisconsin, Madison, Invited Talk, “Studying Two-Fluid MHD Turbulence with High Resolution Simulations – Connection with Observations”.
- Aug 29 to Aug 31, 2012, 2nd ICM Theory and Computation Workshop, Univ. of Michigan, Ann Arbor, Invited Talk, “Thermal Conduction in Astrophysical Simulations – Applications to SNRs and HVCs”.
- May 1, 2013, Midwest Magnetic Fields Workshop, Univ. of Wisconsin, Madison, Invited Talk, “Simulating High Velocity Clouds with Adaptive Mesh Refinement”.
- July 1 – 5, ASTRONUM-2013 Conference in Biarritz, France, Invited Talk, “Multidimensional HLLC/HLLD Riemann Solvers for MHD”.
- Sept. 13, Invited Talk, CEA Saclay, France, “Observational Diagnostics of Two-Fluid Turbulence in Molecular Clouds – As Suggested by Simulations”.
- Sept. 15 to Sept. 21, 2013, High-Resolution Mathematical and Numerical Analysis of Involution-Constrained PDEs Workshop, Oberwolfach, Germany, Invited Talk, “Parallel, Divergence-free Adaptive Mesh Refinement for Magnetohydrodynamics at High Orders -- Methods and Implementation”.
- Oct. 12 to 16, 2013, Invited Talk, STScI Baltimore, “Observational Diagnostics of Two-Fluid Turbulence in Molecular Clouds – As Suggested by Simulations”.
- Oct. 25 to 27, 2013, Invited Talk, 22nd Midwest Relativity and Compact Objects Meeting at the Univ. of Wisconsin-Milwaukee, “Multi-dimensional Riemann solvers for Relativistic MHD”
- Nov. 21 and 22, 2013, Invited Talk, Livermore National Laboratory, “ADER-WENO Schemes for High Accuracy Simulation of Conservation Laws”.
- Nov. 21 and 22, 2013, Invited Talk, Livermore National Laboratory, “Divergence-free Magnetohydrodynamics at High Orders with Multidimensional Riemann Solvers”.

- Jan. 10, 2014, Invited Talk, S.N Bose National Centre for Basic Sciences, Kolkata, “Observational Diagnostics of Two-Fluid Turbulence in Molecular Clouds – As Suggested by Simulations”.
- Jan. 11, 2014, Invited Talk, S.N Bose National Centre for Basic Sciences, Kolkata, “Divergence-free Magnetohydrodynamics at High Orders with Multidimensional Riemann Solvers”.
- Feb. 6, 2014, Invited Talk, University of Toledo, “Observational Diagnostics of Two-Fluid Turbulence in Molecular Clouds – As Suggested by Simulations”.
- Feb. 17, 2014, Invited Talk, Sandia National Laboratory, “Divergence-free Magnetohydrodynamics at High Orders with Multidimensional Riemann Solvers”.
- Feb. 18, 2014, Invited Talk, Los Alamos National Laboratory, “Divergence-free Magnetohydrodynamics at High Orders with Multidimensional Riemann Solvers”.
- Feb. 19, 2014, Invited Talk, Los Alamos National Laboratory, “Observational Diagnostics of Two-Fluid Turbulence in Molecular Clouds – As Suggested by Simulations”.
- Feb. 21, 2014, Invited Talk, Purdue University, “Observational Diagnostics of Two-Fluid Turbulence in Molecular Clouds – As Suggested by Simulations”.
- April 3, 2014, Invited Talk, SIAM Conference on Uncertainty Quantification, “Quantifying Uncertainty in Computational Astrophysics via Two-Fluid Simulations.”
- April 28, 2014, Invited Talk, Midwest Magnetic Fields Conference, “Observational Diagnostics of Two-Fluid Turbulence in Molecular Clouds – As Suggested by Simulations”.
- May 12-14, 2014, Invited Talk, Workshop on Relativistic Astrophysics, Purdue University, “Multi-dimensional Riemann solvers for Relativistic MHD”
- June 23-27, 2014, Invited Talk, Astronom 2014, Palm Springs CA, “Multi-dimensional Riemann solvers for Relativistic MHD”.
- October 9, 2014, Invited Talk, Conference on Turbulence in the Sky as on Earth, Brazil, “Observational Diagnostics of Two-Fluid Turbulence in Molecular Clouds – As Suggested by Simulations”.
- October 21, 2014, Invited Talk, University of Nice Sophia-Antipolis, France, “Recent Advances in Numerical MHD and Multidimensional Riemann Solvers”
- October 23, 2014, Invited Talk, University of Zurich, Switzerland, “Recent Advances in Numerical MHD and Multidimensional Riemann Solvers”

- March 16-20, 2015, Invited Talk, European Conference on High Order Nonlinear Numerical Methods, Trento, Italy, “Recent Advances in Multidimensional Riemann Solvers and their Use”
- May 10-15, 2015, Invited Talk, Higher Order Numerical Methods for Evolutionary PDEs: Applied Mathematics Meets Astrophysical Applications, Banff International Research Station for Mathematical Innovation and Discovery, “Recent Advances in Multidimensional Riemann Solvers and their Use”
- May 18 -22, 2015, Invited Talk, SHARK-FV (Sharing Higher-order Advanced Know-how on Finite Volume) conference, Ofir, Portugal, “Recent Advances in Multidimensional Riemann Solvers and their Use”
- June 8-12, 2015, Invited Talk, Astronom 2015, Avignon, France, “Subluminal Relativistic MHD with Multidimensional Riemann Solvers”
- June 11, 2015, Invited Talk, University of Nice Sophia-Antipolis, France, “Observational Diagnostics of Two-Fluid Turbulence in Molecular Clouds – As Suggested by Simulations”
- June 18, 2015, Invited Talk, INRIA Nice, France, “Recent Advances in Multidimensional Riemann Solvers and their Use”
- August 10-14, 2015, Invited Talk, International Congress on Industrial and Applied Mathematics (ICIAM 2015), Beijing, China, “Recent Advances in Multidimensional Riemann Solvers and their Use”
- December 21-23, 2015, Invited Talk, Conference on Computational PDE, TIFR, Bangalore, India, “Recent Advances in Multidimensional Riemann Solvers and their Use”
- January 11-15, 2016, Invited Talk, Fifth Chilean Workshop on Numerical Analysis of Partial Differential Equations, WONAPDE 2016, “Recent Advances in Multidimensional Riemann Solvers and their Use”
- January 25-26, 2016, Invited Talk, CEA/GAMNI/SMAI Workshop on Computational Fluid Dynamics, Paris, France, “Recent Advances in Multidimensional Riemann Solvers and their Use”
- May 9-12, 2016, Invited Talk, Second Purdue Workshop on Relativistic Astrophysics, Purdue University, “On the Linear Stability of Sheared and Magnetized Jets Without Current Sheets”
- May 16-27, 2016, Invited Lecturer to the Les Houches Summer School on Computational Astrophysics, to give a sequence of six invited lectures and three practicum sessions on “Higher Order Methods for Multidimensional Computational MHD in Astrophysics”
- June 6-10, 2016, Invited Talk, Astronom 2016, Monterey, California, “On the Linear and Nonlinear Stability of Sheared and Magnetized Jets Without Current Sheets”

- July 4-6, 2016, Invited Talk, 14th International Interdisciplinary Seminar on Mathematical Models and Modeling Laser-Plasma Processes and Advanced Science and Technology, Moscow, “Recent Advances in Multidimensional Riemann Solvers and their Use in Higher Order Schemes”
- July 7-9, 2016, Invited Lecturer to a Summer School in Computational Physics in Moscow, to give a sequence of three invited lectures on “Higher Order Godunov Schemes Based on Multidimensional Riemann Solvers – Theory and Applications”.
- July 21-23, 2016, Invited Talk, NIMS Workshop on Recent Progress on Higher-Order Methods and Computational Fluids, Daejeon, South Korea, “Recent Advances in Multidimensional Riemann Solvers and their Use in Higher Order Schemes”
- August 10, 2016, Invited Talk, Institute for Applied Physics and Computational Mathematics, Beijing, “1D HLLI Universal Riemann Solver for Conservative and Non-Conservative Hyperbolic Systems”
- August 10, 2016, Invited Talk, Institute for Applied Physics and Computational Mathematics, Beijing, “Multidimensional, Self-similar, strongly-Interacting, Consistent (MuSIC) Riemann Solvers – Applications to Divergence-Free MHD and ALE Schemes”
- August 17, 2016, Invited Talk, Institute for Applied Physics and Computational Mathematics, Beijing, “Constraint-Preserving Higher Order Schemes and a Gentle Introduction to Modern ADER Methods”
- November 2-4, 2016, Invited Talk, International Workshop on Nonlinear Numerical Methods for Hyperbolic PDEs Celebrating Prof. Toro’s 70th Birthday, Trento, Italy, “So, what’s new in Computational Electrodynamics?”
- December 21, 2016, Invited Talk, TIFR-CAM, Bangalore, India, “HLLI Universal Riemann Solver for Conservative and Non-Conservative Hyperbolic Systems, And its Multidimensional Extensions”
- January 6, 2017, Invited Talk, Institute for Applied Physics and Computational Mathematics, Beijing, “HLLI Universal and Complete Riemann Solver for Conservative and Non-Conservative Hyperbolic Systems, And its Multidimensional Extensions”
- January 9, 2017, Invited Talk, Institute for Applied Physics and Computational Mathematics, Beijing, “So, what’s new in Computational Electrodynamics?”
- June 26-30, Invited Talk, Astronom 2017, Saint-Malo, France, “Constraint-Preserving DG schemes for High Order MHD, RMHD, CED”
- July 3-7, 2017, Invited Talk, International Conference on Numerical Simulation for Multimaterial and Multiphysics Flows, Beijing, “HLLI Universal and Complete Riemann Solver for Conservative and Non-Conservative Hyperbolic Systems, And its Multidimensional Extensions”

- July 11, 2017, Invited Talk, Chinese Academy of Mathematics and Systems Science, Beijing, “HLLI Universal and Complete Riemann Solver for Conservative and Non-Conservative Hyperbolic Systems, And its Multidimensional Extensions”
- December 4 to 16, 2017, Invited GIAN Professor, gave a sequence of 27 lectures at IIT Delhi Winter School on Numerical PDE Techniques for Scientists and Engineers
- May 7 to 9, 2018, Invited Talk, Third Purdue Workshop on Relativistic Plasma Astrophysics, “Geodesic Mesh MHD, A New Paradigm for Computational Astrophysics and Space Physics Applied to Spherical Systems”
- May 30 to 31, 2018, Invited Talk, Midwest Magnetic Fields Workshop, Madison, Wisconsin, “Geodesic Mesh MHD, A New Paradigm for Computational Astrophysics and Space Physics Applied to Spherical Systems”
- June 5, 2018, Invited Talk, Blue Waters Conference, “Two Fluid Turbulence and Dynamos in Molecular Clouds and a New Paradigm for Computational Astrophysics”
- June 11, Invited Talk, Northwestern University, “Bringing Astrophysics Down to Earth: The Development of a New Generation of High-Accuracy Methods for Computational Electrodynamics”
- June 25 to 29, 2018, Invited Talk, Brown University Topical workshop on Computational Aspects of Time Dependent Electromagnetic Wave Problems in Complex Materials, “Higher Order Globally Constraint-Preserving FVTD and DGTD Schemes for Time-Dependent Computational Electrodynamics”
- June 25 to 29, 2018, Invited Talk, Astronom 2018, Panama City Beach, Florida, “Geodesic Mesh MHD, A New Paradigm for Computational Astrophysics and Space Physics Applied to Spherical Systems”
- July 6, 2018, Invited Talk, TIFR-CAM, Bangalore, India, “Higher Order Globally Constraint-Preserving FVTD and DGTD Schemes for Time-Dependent Computational Electrodynamics”
- July 14 to 22, 2018, Invited Talk, COSPAR Conference, Pasadena USA, “Geodesic Mesh MHD, A New Paradigm for Computational Astrophysics and Space Physics Applied to Spherical Systems”
- July 14 to 22, 2018, Invited Talk, COSPAR Conference, Pasadena USA, “Observational Diagnostics of Two-Fluid Turbulence in Molecular Clouds – As Suggested by Simulations”
- Oct 31 to Nov 2, 2018, Invited Talk, International Conference on Cosmic Dust and Magnetism, Daejeon, Korea, “Geodesic Mesh MHD, A New Paradigm for Computational Astrophysics and Space Physics Applied to Spherical Systems”

- Nov. 14, Invited Talk, S.N. Bose Center, Koalkatta, India, “Geodesic Mesh MHD, A New Paradigm for Computational Astrophysics and Space Physics Applied to Spherical Systems”
- Jan. 2019, Invited Talk, USNC-URSI National Radio Science Meeting, Boulder, CO, “So, what’s new in Computational Electrodynamics?”

Undergraduate Student Supervision

- Tom Burger, 2005 -- 2006, Univ. of Notre Dame
- Anthony Bendinelli, 2006 --2007 , Univ. of Notre Dame, Hons. Thesis
- Andrew Massari, 2006 --2008 , Univ. of Notre Dame
- Janie Hoorman, 2011 – 2011, Baylor University
- Vu Nguyen, 2012 - 2013, Univ. of Notre Dame
- Daniel George, 2014 – 2014, Indian Institute of Technology, Bombay
- Prasanna Siddireddi, 2014 – 2014, Indian Institute of Technology, Bombay
- Atul Kedia, 2015 – 2015, Indian Institute of Technology, Bombay
- Saquib Alam, 2015 – 2015, Indian Institute of Technology, Bombay

Graduate Student Supervision

- Richard Gerber, Ph.D. granted 1993, University of Illinois, (in conjunction with S. Lamb)
- Bohr He, M.S. granted 1995, University of Pittsburgh, (in conjunction with R. Melhem)
- Arne Taube, Ph.D. granted 2005, University of Stuttgart (in conjunction with C.D. Munz)
- Chris D’Andrea, P.h.D. granted 2006, Univ. of Notre Dame (in conjunction with J.Poirier & T.Rettig)
- Christoph Altmann, Ph.D. granted 2006, University of Stuttgart (in conjunction with C.D. Munz)
- Tobias Rumpf, M.S. granted 2008, University of Stuttgart (in conjunction with C.D. Munz)
- Huijing Du, 2008 -- 2013, Univ. of Notre Dame (in conjunction with Z. Xu)
- Chad Meyer, 2008 -- 2014, Univ. of Notre Dame (Ph.D. granted 2014)
- Sethupathy Subramanian, 2017 -- , Univ. of Notre Dame

Postdoctoral Supervision

- B.H. Liou, 1997-1999, Univ. of Illinois at Urbana-Champaign
- J.S. Kim, 2000-2002, Univ. of Notre Dame
- J.L. Fisker, 2004-- 2007, Univ. of Notre Dame
- D.Tilley, 2005-- 2011, Univ. of Notre Dame
- O. Zannotti, 2007 -- 2008, Univ. of Notre Dame
- K. Cai, 2008 – 2009, Univ. Of Notre Dame
- J. Kim, 2013 – 2017 , Univ. Of Notre Dame
- S. Garain, 2014 – , Univ. Of Notre Dame

Consultancies

- March 1991 - March 1993 ICASE, NASA Langley
- September 1996 – September 1999 Goddard Space Flight Center

Publications by Dinshaw S. Balsara

- [1] **D.S. Balsara** & A. Brandt, Multilevel Methods for Fast Solution of N-Body and Hybrid Systems, Int. Ser. Num. Math., Vol. 98, Pgs. 131-142 (1991).
- [2] **D.S. Balsara** & M.L. Norman, Simulations of Narrow Angle Tailed Radio Sources I: The Begelman, Rees and Blandford Model, Ap.J., Vol. 393, Pgs. 631-647 (1992).
- [3] R.A. Gerber, S.A. Lamb & **D.S. Balsara**, A Model for Ring Galaxies: Arp 147-like Systems, Ap.J. Lett., Vol. 399, Pgs. L51-L54 (1992).
- [4] **D.S. Balsara** & J.H. Krolik, Numerical Simulation on X-ray Heated Winds in Seyfert Galaxies: I. The Case of Zero Angular Momentum Ap. J., Vol. 402, Pgs. 109-124 (1993).
- [5] **D.S. Balsara**, Higher Order Godunov Schemes for Isothermal Hydrodynamics, Ap.J., Vol. 420, Pgs. 197-212 (1994).
- [6] **D.S. Balsara**, Riemann Solver for Relativistic Hydrodynamics, J. Comput. Phys., Vol. 114, Pgs. 284-297 (1994).
- [7] A. Suchkov, **D.S. Balsara**, T. Heckman and C. Leitherer, Dynamics and X-Ray Emission of a Galactic Superwind Interacting with Disk and Halo Gas, Ap. J., Vol. 430, Pgs. 511-532 (1994).
- [8] **D.S. Balsara**, C. O'Dea & M. Livio, Galaxies in Clusters: Gas Stripping and Accretion, Ap. J., Vol. 437, Pgs. 83-90 (1994).
- [9] R.A. Gerber, S.A. Lamb & **D.S. Balsara**, Galactic Scale Gas Flows in Colliding Galaxies: 3-Dimensional, N-Body/Hydrodynamics Experiments, Astron. and Sp. Sci., Vol. 216, Pgs. 337-346 (1994).
- [10] **D.S. Balsara**, von Neumann Stability Analysis of Smoothed Particle Hydrodynamics -- Suggestions for Optimal Algorithms, J. Comput. Physics, Vol. 121, Pgs. 373-372 (1995).
- [11] R.A. Gerber, S.A. Lamb & **D.S. Balsara**, A Stellar and Gas Dynamical Numerical Model of Ring Galaxies, Monthly Notices of the Royal Astronomical Society, Vol. 276, Pgs. 345-366 (1996).
- [12] P.L. Roe & **D.S. Balsara**, Notes on the Eigensystem of Magnetohydrodynamics, SIAM Journal of Applied Mathematics, Vol. 56, Pgs. 57-67 (1996).
- [13] **D.S. Balsara**, Wave Propagation in Molecular Clouds, Ap.J., Vol. 465, Pgs. 775-794 (1996).
- [14] A. Suchkov, V. Berman **D.S. Balsara**, & T. Heckman, Mass Loading and Collimation of Galactic Superwinds, Ap.J., Vol. 463, Pgs. 528-534 (1996).

- [15] **D.S. Balsara**, Linearized Formulation of the Riemann Problem for Adiabatic and Isothermal Magnetohydrodynamics, *Ap.J. Supp.*, Vol. 116, Pg. 119-131 (1998).
- [16] **D.S. Balsara**, Total Variation Diminishing Algorithm for Adiabatic and Isothermal Magnetohydrodynamics, *Ap.J. Supp.*, Vol. 116, Pgs. 133-153 (1998).
- [17] X. Yuan, C. Salisbury **D.S. Balsara**, and R. Melhem , A Load Balancing Package on Distributed Memory Systems and its Application to Particle-Particle Particle-Mesh Methods, *Parallel Computing*, Vol. 23, Pgs. 1525-1544, (1998).
- [18] **D.S. Balsara** & A. Pouquet, The Formation of Large-Scale Structures in Compressible MHD Flows, *Phys. of Plasmas*, Vol. 6, Pgs. 89-99 (1999).
- [19] **D.S. Balsara** & D. Spicer, A Staggered Mesh Algorithm Using Higher Order Godunov Fluxes to Ensure Solenoidal Magnetic Fields in MHD Simulations, *J. Comput. Phys.*, Vol. 149, Pgs. 270-292 (1999).
- [20] **D.S. Balsara** & D. Spicer, Maintaining Pressure Positivity in MHD Flows, *J. Comput. Phys.*, Vol. 148, Pg. 133-148 (1999).
- [21] **D.S. Balsara**, An Analysis of the Hyperbolic Nature of the Equations of Radiation Hydrodynamics, *J. Quant. Spectroscopy & Rad. Transf.*, Vol. 61 (#5), Pgs. 617-627 (1999).
- [22] **D.S. Balsara**, Linearized Formulation of the Riemann Problem for Radiation Hydrodynamics, *J. Quant. Spectroscopy & Rad. Transf.*, Vol. 61 (#5), Pgs. 629-635 (1999).
- [23] **D.S. Balsara**, The Eigenstructure of the Equations of Radiation Magnetohydrodynamics, *J. Quant. Spectroscopy & Rad. Transf.*, Vol. 61 (#5), Pgs. 637-646 (1999).
- [24] **D.S. Balsara**, Linearized Formulation of the Riemann Problem for Radiation Magnetohydrodynamics, *J. Quant. Spectroscopy & Rad. Transf.*, Vol. 62, Pgs. 167-180 (1999).
- [25] **D.S. Balsara**, Exact Jacobians of Roe-Type Flux Difference Splitting of the Equations of Radiation Hydrodynamics (and Euler Equations) for Use in Time-Implicit Higher Order Godunov Schemes, *J. Quant. Spectroscopy & Rad. Transf.*, Vol. 62, Pgs. 255-278 (1999).
- [26] **D.S. Balsara** & C.-W. Shu Monotonicity Preserving Weighted Essentially Non-Oscillatory Schemes with Increasingly High Order of Accuracy, *J. Comput. Phys.*, Vol. 160, Pgs. 405-452 (2000).
- [27] **D.S. Balsara**, Total Variation Diminishing Scheme for Relativistic Magnetohydrodynamics, *Ap.J. Supp.*, Vol. 132, Pgs. 83-101 (2001).

- [28] **D.S. Balsara** & C.D. Norton, Highly Parallel Structured Adaptive Mesh Refinement Using Parallel Language-Based Approaches, *Parallel Computing*, Vol. 27, Pgs. 37-70 (2001).
- [29] **D.S. Balsara**, Fast and Accurate Discrete Ordinates Methods for Multidimensional Radiative Transfer, *J. Quant. Spectroscopy & Rad. Transf.*, Vol. 69(6), Pgs. 671-706 (2001).
- [30] **D.S. Balsara**, R.M. Crutcher and A. Pouquet, Turbulent Flows Within Self-Gravitating Magnetized Molecular Clouds, *Ap.J.*, Vol. 557, Pgs. 451-463 (2001).
- [31] **D.S. Balsara**, D. Ward-Thompson, & R.M. Crutcher, A Turbulent MHD Model for Molecular Clouds and a New Method of Accretion on to Star-forming Cores, *Monthly Notices of the Royal Astronomical Society*, Vol. 327, Pgs. 715-720 (2001).
- [32] **D.S. Balsara**, Divergence-Free Adaptive Mesh Refinement for Magnetohydrodynamics, *J. Comput. Phys.*, Vol. 174(2), Pgs. 614-648 (2001).
- [33] **D.S. Balsara**, R.A. Benjamin & D. Cox, The Evolution of Adiabatic Supernova Remnants in a Turbulent Magnetized Medium, *Astrophys. J.*, Vol. 563, Pgs. 800-805 (2001).
- [34] **D.S. Balsara**, Adaptive Mesh Refinement in Computational Astrophysics – Methods and Applications, *J. Korean Astronomical Society*, Vol. 34, Pgs. 181-190 (2001).
- [35] J. Kim, **D.S. Balsara**, M.-M. Mac Low, Turbulence Driven by Supernova Explosions in a Radiatively-Cooling Magnetized Interstellar Medium, *J. Korean Astronomical Society*, Vol. 34, Pgs. 181-190 (2001).
- [36] B.H. Liou & **D.S. Balsara**, An Implicit, Unstructured Adaptive Grid Approach for Compressible Flows with Moving Boundaries, *AIAA Paper 2001-0440* (2001).
- [37] H. Lee, D. Ryu, J.S. Kim, T.W. Jones & **D.S. Balsara**, Effects of Magnetic Fields on Two-Dimensional Compressible Turbulence, *Ap.J.*, Vol. 594, Pgs. 627-636, (2003).
- [38] **D.S. Balsara** & J.S. Kim, An Intercomparison Between Divergence-Cleaning and Staggered Mesh Formulations for Numerical Magnetohydrodynamics, *Ap.J.*, Vol. 602, Pgs. 1079-1090, (2004).
- [39] **D.S. Balsara**, Second Order Accurate Schemes for Magnetohydrodynamics With Divergence-Free Reconstruction, *Ap.J.Supp.*, Vol. 151(1), Pgs. 149-184, (2004).
- [40] M. Torrilhon & **D.S. Balsara**, High Order WENO Schemes: Investigations on Non-Uniform Convergence for MHD Riemann Problems, *J. Comp. Phys.* Vol. 201, Pgs. 586-600, (2004).
- [41] **D.S. Balsara**, J.S. Kim, M.M. Mac Low and G. J. Mathews, Amplification of Magnetic Fields in the Multi-phase ISM with Supernova-Driven Turbulence, *Ap.J.*, Vol. 617, Pgs. 339-349 (2004).

- [42] M.M. MacLow, **D.S. Balsara**, M. de Avillez and J.S. Kim, The Distribution of Pressures in a SN-Driven Interstellar Medium I. Magnetized Medium, *Ap.J.*, Vol. 626, Pgs. 864-876 (2005).
- [43] **D.S. Balsara** & J.S. Kim, Amplification of Magnetic Fields by Supernova-Driven Turbulence, Part II – The Role of Dynamical Chaos, *Ap.J.* Vol. 634, Pgs. 390-406, (2005).
- [44] J.L. Fisker & **D.S. Balsara**, Simulating the Boundary Layer Between a White Dwarf and its Accretion Disk, *Ap.J.Lett.*, Vol. 635, Pgs. L69-L72, (2005).
- [45] T. Rettig, S. Brittain, E. Gibb, **D.S. Balsara**, D.Tilley, T. Simon, C. Kulesa, Dust Stratification in Young Disks, *ApJ*, 646, 342-350, (2006).
- [46] D.A. Tilley & **D.S. Balsara**, Anisotropic Thermal Conduction in Supernova Remnants: Relevance to Hot Gas Filling Factors in the Magnetized ISM, *ApJ.Lett*, Vol. 645, Pgs. L49-L52, (2006).
- [47] D.A. Tilley, **D.S. Balsara**, J.C. Howk, Simulations of Mixed Morphology Supernova Remnants With Anisotropic Thermal Conduction, *Monthly Notices of the Royal Astronomical Society*, Vol. 371, Pgs. 1106-1112, (2006).
- [48] L. Piau, T.C. Beers, J. Truran, & **D.S. Balsara**, From First Stars to the Spite Plateau: a Possible Reconciliation of Halo Stars Observations with Predictions from Big Bang Nucleosynthesis, *ApJ*, Vol. 653, Pgs. 301-315, (2006).
- [49] A.Taube, M. Dumbser, **D.S, Balsara** & C.D. Munz, Arbitrary High Order Discontinuous Galerkin Schemes for the MHD Equations, *SIAM J. Scientific Computing*, Vol. 30(3), Pgs. 441-461, (2007).
- [50] **D.S. Balsara**, C. Altmann, C.-D. Munz, M. Dumbser, A Sub-cell Based Indicator for Troubled Zones in RKDG Schemes and a Novel Class of Hybrid RKDG+HWENO Schemes, *J. Comp. Phys.*, Vol. 226, Pgs. 586-620 (2007).
- [51] S. Brittain, T. Simon, T.W. Rettig, **D.S. Balsara**, D.A. Tilley, E. Gibb, Post-Outburst Observations of V1647 Orionis: Detection of a Brief Warm Molecular Outflow, *Ap.J.Lett*, Vol. 670, Pgs. L29-L32 (2007).
- [52] **D.S. Balsara**, D.A. Tilley & J.C. Howk , Simulating Anisotropic Thermal Conduction in Supernova Remnants I : Numerics and Evolution of Remnants, *Monthly Notices of the Royal Astronomical Society*, Vol. 386, Pgs. 627-641 (2008).
- [53] **D.S. Balsara**, A.J. Bendinelli, D.A. Tilley, A. R. Massari & J.C. Howk , Thermal Conduction in Supernova Remnants II : Implications for the ISM, *Monthly Notices of the Royal Astronomical Society*, Vol. 386, Pgs. 642-656, (2008).
- [54] D.A. Tilley & **D.S. Balsara**, A Two-fluid Method for Ambipolar Diffusion, *Monthly Notices of the Royal Astronomical Society*, 389, 1058, (2008)

- [55] M. Dumbser, **D.S. Balsara**, E.F. Toro & C.-D. Munz, A Unified Framework for the Construction of Quadrature-Free One-Step Finite-Volume and Discontinuous Galerkin Schemes, *J. Comp. Phys.*, Vol. 227, Pgs. 8209-8253 (2008).
- [56] **D.S. Balsara**, T. Rumpf, M. Dumbser & C.-D. Munz, Efficient, High Accuracy ADER-WENO Schemes for Hydrodynamics and Divergence-Free Magnetohydrodynamics, *J. Comp. Phys.*, Vol. 228, Pgs. 2480-2516 (2009).
- [57] **D.S. Balsara**, Divergence-free Reconstruction of Magnetic Fields and WENO Schemes for Magnetohydrodynamics, *J. Comp. Phys.*, Vol. 228, Pgs. 5040-5056 (2009).
- [58] **D.S. Balsara**, D.A. Tilley, T. Rettig & S.A. Brittain, Dust Settling in Magnetorotationally-Driven Turbulence I : Numerical Methods and Evidence for a Vigorous Streaming Instability, *Monthly Notices of the Royal Astronomical Society*, Vol. 297, Pgs. 24-43 (2009).
- [59] **D.S. Balsara**, Fisker, J.L., Sion, E.M. & Godon, P., Simulations of the Boundary Layer Between a White Dwarf and its Accretion Disk, *ApJ*, Vol. 702(2), Pgs. 1536-1552, (2009).
- [60] C. D'Andrea, J. Poirier & **D.S. Balsara** , Experimental Data and Analysis of the October 2003 Forbush Decrease, *Advances in Space Research*, Vol. 44, Pgs. 1247-1251 (2009).
- [61] D.A. Tilley, **D.S. Balsara**, T. Rettig & S.A. Brittain, Dust Settling in Magnetorotationally-Driven Turbulence II : Pervasiveness of the Streaming Instability and its Consequences, *Monthly Notices of the Royal Astronomical Society*, Vol. 403, Pgs. 211-228 (2010).
- [62] **D.S. Balsara**, Multidimensional Extension of the HLLC Riemann Solver; Application to Euler and Magnetohydrodynamical Flows, *J. Comp. Phys.* Vol. 229, Pgs. 1970-1993 (2010).
- [63] M. Dumbser and **D.S. Balsara**, High-Order Unstructured One-Step PNPM Schemes for the Viscous and Resistive MHD Equations, *Computer Modeling for Engineers and Scientists*, Vol. 54(3), Pgs. 301-334 (2010).
- [64] D.A. Tilley and **D.S. Balsara**, Direct Evidence for Two-Fluid Effects in Molecular Clouds, *Monthly Notices of the Royal Astronomical Society*, Vol. 406, Pgs. 1201-1207 (2010).
- [65] D.A. Tilley and **D.S. Balsara**, Two-Fluid Ambipolar Diffusion for Molecular Clouds with Realistic Heating and Cooling, *Monthly Notices of the Royal Astronomical Society*, Vol. 415, Pgs. 3681-3692 (2011)
- [66] D.A. Tilley, **D.S. Balsara** and C. Meyer, A Numerical Scheme and Benchmark Tests for Two-fluid Ambipolar Diffusion, *New Astronomy*, Vol. 17, Pgs. 368-376 (2012).

- [67] **D.S. Balsara**, Self-Adjusting, Positivity Preserving High Order Schemes for Hydrodynamics and Magnetohydrodynamics, *J. Comp. Phys.*, Vol. 231 (2012) Pgs. 7504-7517 (Also published as an Article of the Future, please see <http://www.sciencedirect.com/science/article/pii/S0021999112000629>)
- [68] **D.S. Balsara**, A Two-Dimensional HLLC Riemann Solver with applications to Euler and MHD Flows, *J. Comp. Phys.*, Vol. 231 (2012) Pgs. 7476-7503 (Also published as an Article of the Future, please see <http://www.sciencedirect.com/science/article/pii/S0021999111007467>)
- [69] C. Meyer, **D.S. Balsara** & T. Aslam, A Second Order Accurate Super Time Stepping Formulation for Anisotropic Thermal Conduction, *Monthly Notices of the Royal Astronomical Society*, Vol. 422, Pgs. 2102-2115 (2012) [DOI: 10.1093/mnras/sts095]
- [70] M. Lyutikov, **D.S. Balsara**, C. Matthews, Crab GeV flares from Corrugated Terminal Shock , *Monthly Notices of the Royal Astronomical Society*, Vol. 42, Pgs. 3118-3129 (2012) .
- [71] D. Home, E. Gibb, T.W. Rettig, S.Brittain, D.Tilley, **D.S. Balsara**, The Gas/Dust Ratio of Circumstellar Disks: Testing Models of Planetesimal Formation, *Astrophysical Journal* Vol. 754, Pgs. 64 (2012).
- [72] **D.S. Balsara**, C. Meyer, M. Dumbser, H. Du and Z. Xu, Efficient Implementation of ADER Schemes for Euler and Magnetohydrodynamical Flows on Structured Meshes – Comparison with Runge-Kutta Methods, *J. Comp. Phys.* Vol. 235, Pgs. 934-969 (2013). (Also published as an Article of the Future, please see <http://www.sciencedirect.com/science/article/pii/S0021999112002860>) [DOI: [10.1016/j.jcp.2012.04.051](https://doi.org/10.1016/j.jcp.2012.04.051)]
- [73] V. Florinski, X. Guo, **D.S. Balsara** and C. Meyer, MHD modeling of Solar System Processes on Geodesic Grids, *Astrophysical Journal Supplements*, Vol. 205, Pgs. 19 (2013) [DOI: [10.1088/0067-0049/205/2/19](https://doi.org/10.1088/0067-0049/205/2/19)]
- [74] M. Dumbser, O. Zanotti, A. Hidalgo and **D.S. Balsara**, ADER-WENO Finite Volume Schemes with Space-Time Adaptive Mesh Refinement, *J. Comp. Phys.* Vol. 248, Pgs. 257-286 (2013) [DOI: [10.1016/j.jcp.2013.04.017](https://doi.org/10.1016/j.jcp.2013.04.017)]
- [75] C. Meyer, **D.S. Balsara** & T. Aslam, S Stabilized Runge-Kutta-Legendre Method for Super-Time-stepping of Parabolic and Mixed Equations, *J. Comp. Phys.*, 257 (2014) 594-626 [DOI: [10.1016/j.jcp.2013.08.021](https://doi.org/10.1016/j.jcp.2013.08.021)]
- [76] C.Meyer, **D.S. Balsara**, B. Burkhart, A. Lazarian, Observational Diagnostics for Two-Fluid Turbulence in Molecular Clouds As Suggested by Simulations, *Monthly Notices of the Royal Astronomical Society*, Vol. 439, Pgs. 2197-2210 (2014) [DOI: [10.1093/mnras/stt1893](https://doi.org/10.1093/mnras/stt1893)]

- [77] **D.S. Balsara**, M. Dumbser and R. Abgrall, Multidimensional HLL and HLLC Riemann Solvers for Unstructured Meshes – With Application to Euler and MHD Flows, *Journal of Computational Physics*, 261 (2014) 172-208 [DOI: [10.1016/j.jcp.2013.12.029](https://doi.org/10.1016/j.jcp.2013.12.029)]
- [78] W. Boscheri, M. Dumbser and **D.S. Balsara**, High Order Lagrangian ADER-WENO Schemes on Unstructured Meshes – Application of Several Node Solvers to Hydrodynamics and Magnetohydrodynamics, *International Journal for Numerical Methods in Fluids*, 76(10) (2014) 737–778 [DOI: [10.1002/flid.3947](https://doi.org/10.1002/flid.3947)]
- [79] W. Boscheri, **D.S. Balsara** and M. Dumbser, Lagrangian ADER-WENO Finite Volume Schemes on Unstructured Triangular Meshes Based on Genuinely Multidimensional HLL Riemann Solvers, *Journal of Computational Physics*, vol. 267 (2014) Pgs. 112-138 [DOI: [10.1016/j.jcp.2014.02.023](https://doi.org/10.1016/j.jcp.2014.02.023)]
- [80] J. Kim and **D.S. Balsara**, A Stable HLLC Riemann solver for Relativistic Magnetohydrodynamics, *Journal of Computational Physics*, vol. 270 (2014) Pgs. 634-639 [DOI: [10.1016/j.jcp.2014.04.023](https://doi.org/10.1016/j.jcp.2014.04.023)]
- [81] **D.S. Balsara**, *Multidimensional Riemann Problem with Self-Similar Internal Structure – Part I – Application to Hyperbolic Conservation Laws on Structured Meshes*, *Journal of Computational Physics* 277 (2014) 163-200 [DOI: [10.1016/j.jcp.2014.07.053](https://doi.org/10.1016/j.jcp.2014.07.053)]
- [82] **D.S. Balsara** and M. Dumbser, *Multidimensional Riemann Problem with Self-Similar Internal Structure – Part II – Application to Hyperbolic Conservation Laws on Unstructured Meshes*, *Journal of Computational Physics*, 287 (2015) 269-292 [DOI: [10.1016/j.jcp.2014.11.004](https://doi.org/10.1016/j.jcp.2014.11.004)]
- [83] B. Burkhart, A. Lazarian, **D.S. Balsara**, C. Meyer, J. Cho, *Alfvénic Turbulence Beyond the Ambipolar Diffusion Scale*, *Astrophysical Journal*, Vol. 805 (2015) Pgs. 118-126 [DOI: [10.1088/0004-637X/805/2/118](https://doi.org/10.1088/0004-637X/805/2/118)]
- [84] **D.S. Balsara** and M. Dumbser, *Divergence-Free MHD on Unstructured Meshes using High Order Finite Volume Schemes Based on Multidimensional Riemann Solvers*, *Journal of Computational Physics* 299 (2015) 687-715 [DOI: [10.1016/j.jcp.2015.07.012](https://doi.org/10.1016/j.jcp.2015.07.012)]
- [85] S. Garain, **D.S. Balsara** and J. Reid, *Comparing Coarray Fortran (CAF) with MPI for Several Structured Mesh PDE Applications*, *Journal of Computational Physics*, Vol. 297 (2015) 237-253 [DOI: [10.1016/j.jcp.2015.05.020](https://doi.org/10.1016/j.jcp.2015.05.020)]
- [86] J. Kim, **D.S. Balsara**, S. Komissarov, M. Lyutikov, D. George, P.K. Siddireddy, *On the Linear Stability of Magnetized Jets Without Current Sheets I – Non-relativistic Case*, *Monthly Notices of the Royal Astronomical Society*, vol. 450 (2015) 982-997 [DOI: [10.1093/mnras/stv606](https://doi.org/10.1093/mnras/stv606)]
- [87] **D.S. Balsara**, *Three Dimensional HLL Riemann Solver for Structured Meshes; Application to Euler and MHD Flow*, *Journal of Computational Physics* 295 (2015) 1-23 [DOI: [10.1016/j.jcp.2015.03.056](https://doi.org/10.1016/j.jcp.2015.03.056)]

- [88] Z. Xu, **D.S. Balsara** and H. Du, *Divergence-Free WENO Reconstruction-Based Finite Volume Scheme for Ideal MHD Equations on Triangular Meshes*, *Communications in Computational Physics*, 19(04) (2016) 841-880 [DOI: [10.4208/cicp.050814.040915a](https://doi.org/10.4208/cicp.050814.040915a)]
- [89] **D.S. Balsara**, J. Vides, K. Gurski, B. Nkonga, M. Dumbser, S. Garain, E. Audit, *A Two-Dimensional Riemann Solver with Self-Similar Sub-Structure – Alternative Formulation Based on Least Squares Projection*, *Journal of Computational Physics* 304 (2016) 138-161 [DOI: [10.1016/j.jcp.2015.10.013](https://doi.org/10.1016/j.jcp.2015.10.013)]
- [90] M. Dumbser and **D.S. Balsara**, *A New, Efficient Formulation of the HLLEM Riemann Solver for General Conservative and Non-Conservative Hyperbolic Systems*, *Journal of Computational Physics* 304 (2016) 275-319 [DOI: [10.1016/j.jcp.2015.10.014](https://doi.org/10.1016/j.jcp.2015.10.014)]
- [91] **D.S. Balsara**, T. Amano, S. Garain, J. Kim, *High Order Accuracy Divergence-Free Scheme for the Electrodynamics of Relativistic Plasmas with Multidimensional Riemann Solvers*, *Journal of Computational Physics* 318 (2016) 169-200 [DOI: [10.1016/j.jcp.2016.05.006](https://doi.org/10.1016/j.jcp.2016.05.006)]
- [92] **D.S. Balsara**, G. Montecinos and E.F. Toro, *Exploring Various Flux Vector Splittings for the MHD System*, *Journal of Computational Physics* 311 (2016) 1-21 [DOI: [10.1016/j.jcp.2016.01.029](https://doi.org/10.1016/j.jcp.2016.01.029)]
- [93] **D.S. Balsara** and J. Kim, *A Subluminal relativistic Magnetohydrodynamics Scheme with ADER-WENO predictor and multidimensional Riemann solver-based corrector*, *Journal of Computational Physics*, Vol. 312 (2016) 357-384 [DOI: [10.1016/j.jcp.2016.02.001](https://doi.org/10.1016/j.jcp.2016.02.001)]
- [94] J. Kim, **D.S. Balsara**, S. Komissarov, M. Lyutikov, *On the Linear Stability of Magnetized Jets Without Current Sheets II – Non-relativistic Case with Shear*, *Monthly Notices of the Royal Astronomical Society*, 461 (2016) 728 [DOI: [10.1093/mnras/stw1051](https://doi.org/10.1093/mnras/stw1051)]
- [95] B. Punsly, **D.S. Balsara**, J. Kim and S. Garain, *HLL Riemann solvers and Alfvén waves in Black Hole magnetospheres*, *Computational Astrophysics and Cosmology* (2016) 3:5 [DOI: [10.1186/s40668-016-0018-1](https://doi.org/10.1186/s40668-016-0018-1)]
- [96] **D.S. Balsara**, S. Garain and C.-W. Shu, *An efficient class of WENO schemes with adaptive order*, *Journal of Computational Physics*, 326 (2016) 780-804 [DOI: [10.1016/j.jcp.2016.09.009](https://doi.org/10.1016/j.jcp.2016.09.009)]
- [97] **D.S. Balsara** and R. Käppeli, *von Neumann Stability Analysis of Globally Divergence-free RKDG and PNPM schemes for the Induction Equation Using Multidimensional Riemann Solvers*, *Journal of Computational Physics* 336 (2017) 104-127 [DOI: [10.1016/j.jcp.2017.01.056](https://doi.org/10.1016/j.jcp.2017.01.056)]
- [98] J. Kim, **D.S. Balsara**, S. Komissarov, M. Lyutikov, *On the Linear Stability of Magnetized Jets Without Current Sheets – Relativistic Case*, *Monthly Notices of the Royal*

- Astronomical Society 467 (2017) 4647-4662 [DOI: [10.1093/mnras/stx409](https://doi.org/10.1093/mnras/stx409)] [DOI: 10.1093/mnras/stx409]
- [99] **D.S. Balsara** and B. Nkonga, *Formulating Multidimensional Riemann Solvers in Similarity Variables – Part III :A Multidimensional Analogue of the HLLI Riemann Solver for Conservative Hyperbolic Systems*, Journal of Computational Physics 346 (2017) 25-48 [DOI: [10.1016/j.jcp.2017.05.038](https://doi.org/10.1016/j.jcp.2017.05.038)]
- [100] **D.S. Balsara**, A. Taflove, S. Garain and G. Montecinos, *Computational Electrodynamics in Material Media with Constraint-Preservation, Multidimensional Riemann Solvers and Sub-Cell Resolution – Part I, Second-Order FVTD Schemes*, Journal of Computational Physics 349 (2017) 604-635 [DOI: [10.1016/j.jcp.2017.07.024](https://doi.org/10.1016/j.jcp.2017.07.024)]
- [101] C.R. Goetz, **D.S. Balsara** and M. Dumbser, *A family of HLL-type solvers for the generalized Riemann problem*, Computers and Fluids, 169 (2018) 201-212 [<https://doi.org/10.1016/j.compfluid.2017.10.028>]
- [102] G. Montecinos and **D.S. Balsara**, *A cell-centered polynomial basis for efficient Galerkin predictors in the context of ADER finite volume schemes. The one-dimensional case*, Computers and Fluids, 156 (2017) 220-238 [DOI: [10.1016/j.compfluid.2017.07.011](https://doi.org/10.1016/j.compfluid.2017.07.011)]
- [103] **D.S. Balsara**, Higher Order Accurate Space-Time Schemes for Computational Astrophysics – Part I – Finite Volume Methods, Living Reviews in Computational Astrophysics, (2017) 3:2 [<https://doi.org/10.1007/s41115-017-0002-8>]
- [104] J. Kim, S. Garain, **D.S. Balsara**, S. Chakrabarti, General Relativistic Numerical Simulation of sub-Keplerian Transonic Accretion Flows onto Black Holes: Schwarzschild Spacetime, Monthly Notices of the Royal Astronomical Society, 472 (2017) 542-549 [DOI: [10.1093/mnras/stx1986](https://doi.org/10.1093/mnras/stx1986)]
- [105] **D.S. Balsara**, A. Taflove, S. Garain and G. Montecinos, *Computational Electrodynamics in Material Media with Constraint-Preservation, Multidimensional Riemann Solvers and Sub-Cell Resolution – Part II, Higher-Order FVTD Schemes*, Journal of Computational Physics 354 (2018) 613-645 [DOI: 10.1016/j.jcp.2017.10.013]
- [106] J. Kim, **D.S. Balsara**, S. Komissarov, M. Lyutikov, *On the Linear Stability of Sheared and Magnetized Jets Without Current Sheets – Relativistic Case*, Monthly Notices of the Royal Astronomical Society, 474 (2018) 3954-3966 [DOI: 10.1093/mnras/stx3065]
- [107] **D.S. Balsara**, J. Li and G. Montecinos, *An Efficient, Second Order Accurate, Universal Generalized Riemann Problem Solver Based on the HLLI Riemann Solver*, submitted, Journal of Computational Physics (2018)
- [108] K. Kitamura and **D.S. Balsara**, *Hybridized SLAU2-HLLI and Hybridized AUSMPW+-HLLI Riemann Solvers for Accurate, Robust, and Efficient Magnetohydrodynamics Simulations*, accepted, Shock Waves, (2018)

- [109] M.A. Shadab, **D.S. Balsara**, W. Shyy, K. Xu, *Fifth order finite volume WENO in orthogonally curvilinear coordinates*, submitted, Journal of Computational Physics, (2018)
- [110] A. Fanfarrillo, S. Garain, **D.S. Balsara**, and D. Nagle, *Resilient Computational Applications using Coarray Fortran*, submitted, Parallel Computing, (2018)
- [111] M. Dumbser, **D.S. Balsara**, M. Tavelli, F. Fambri, *A divergence-free semi-implicit finite volume scheme for ideal, viscous and resistive magnetohydrodynamics*, submitted, International Journal for Numerical Methods in Fluids, (2018)
- [112] **D.S. Balsara** and R. Käppeli, *von Neumann Stability Analysis of Globally Constraint-Preserving DGTD Schemes for the Maxwell Equations using Multidimensional Riemann Solvers*, submitted, Journal of Computational Physics, (2018)
- [113] S. Garain, **D.S. Balsara**, S. Chakrabarti, J. Kim, *Advection of Magnetic Field Loops By Sub-Keplerian Accretion Flows Onto a Black Hole*, submitted, Monthly Notices of the Royal Astronomical Society, (2018)

Unrefereed

- [1] 3D Hydrodynamical Simulations of Extragalactic Jets (with M.L. Norman), Ringberg Conference on Extragalactic Jets (1991).
- [2] AMR++, AC++ Object Oriented Class Library for Parallel Adaptive Mesh Refinement Fluid Applications (with M. Lemke and D.J. Quinlan), ASME Int. Conf. on Adaptive Multilevel Computational Strategies held in California, Sept. 8-13, 1992.
- [3] Colliding Galaxies, Shocked Gas, and Violent Star Formation (with S.A. Lamb and R.A. Gerber) in “Violent Star Formation: From 30 Dor to QSO’s” ed G. Tenorio-Tagle, LaPalma, Nov. 1993.
- [4] A Load Balancing Package for Domain Decomposition on Distributed Memory Systems (with X. Yuan, B. He and R. Melhem), High Performance Computing and Networks, Brussels, Belgium (1996).
- [5] Numerical Simulations of MHD Turbulence and Gravitational Collapse (with R. Crutcher and A. Pouquet), October Conference on Star Formation Near and Far, eds. S. Holt and L. Mundy, pg. 89 (1997).

- [6] On The Role of Relativistic Hydrodynamic Simulations in AGN Research, Invited review, Pune AGN Workshop, eds. J.J. Perry and S.A. Lamb (1996).
- [7] Modern Schemes for Solving Hyperbolic Conservation Laws of Interest in Computational Astrophysics on Parallel Machines., Invited review, Halifax conference on Computational Astrophysics, ed. D.A. Clarke (1997).
- [8] Parallel Object-Oriented Adaptive Mesh Refinement (with D. Quinlan), SIAM Conference on Parallel Computing held in Minneapolis (1997).
- [9] Numerical Magnetohydrodynamic Studies of Turbulence and Star Formation (with A. Pouquet, D. Ward-Thompson and R.M. Crutcher), Interstellar Turbulence, eds. J. Franco and A. Carraminana, held in Puebla, Mexico (1998).
- [10] Innovative Language-Based, Object-Oriented Structured AMR using Fortran 90 and OpenMP (with C. Norton), Current Trends in High Performance Computing, HPCU '99, ed. Y. Deng, held in SUNY Stony Brook, New York (1999).
- [11] The RIEMANN Framework and Higher Order Godunov Schemes for Parallel, Self-Adaptive Computational Astrophysics, 2000, Astrophysical Plasmas, Codes, Models and Observations, eds. J. Arthur, N. Brickhouse and J. Franco, held in Mexico City, Mexico, 1999.
- [12] Numerical Simulation of Dynamos with Scale Separation, 2000, Astrophysical Plasmas, Codes, Models and Observations, eds. J. Arthur, N. Brickhouse and J. Franco, held in Mexico City, Mexico, 1999.
- [13] **D.S. Balsara** & J.L. Fisker, Simulating the Boundary Layer Between a Protostar and its Accretion Disk, Protostars and Planets, LPI Contribution No. 1286., p.8631, (2005).
- [14] T. Rettig, S. Brittain, **D.S. Balsara**, T. Simon & C. Kulesa, Protostars and Planets, LPI Contribution No. 1286., p.8553, (2005).
- [15] J.L. Fisker, **Balsara, D.S.** & Burger, T., The Accretion and Spreading of Matter of White Dwarfs, New Astronomy Reviews, 50, 509-515 (2006).
- [16] Kim, J., & **Balsara, D. S.**, Astronomische Nachrichten, in Proceedings of the origin and evolution of cosmic magnetism, eds. R. Beck, G. Brunetti, L. Feretti, and B. Gaensler, Wiley-VCH, Vol. 327, No. 5/6, pp. 433-438, (2006)
- [17] **Balsara, D.S.**, Tilley, D.A., Rettig, T. & Brittain, S.D., IAU Symposium #243 on Disks Around Stars , held in Grenoble , Dust Sedimentation in Protostellar Accretion Disks, <http://www.iaus243.org/IMG/pdf/balsara.pdf> (2007)
- [18] S.D. Brittain, T. Simon, T.W. Rettig, **D.S. Balsara**, D.A. Tilley, E. Gibb, IAU Symposium #243 on Disks Around Stars, held in Grenoble, Last Gasp of V1647 Ori: A Brief Post-Outburst Warm, Molecular Wind (2007)

- [19] V. Florinski, X. Guo, **D.S. Balsara**, C. Meyer, Heliospheric Modeling on Geodesic Grids, Astronom 2011, ed. N. Pogorelov (2011)