

## Curriculum Vita for Dinshaw S. Balsara

### Address and Telephone Number

Physics Department  
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### Date and Place of Birth

December 23, 1960, Bombay, India, Permanent Resident in the U.S.

### 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 – April 2007 : Assistant Professor, Physics Department, Univ. of Notre Dame
- May 2007 – : Associate Professor, Physics Department, Univ. of Notre Dame

### Honors

- 1982 Best Student in Physics, Indian Institute of Technology
- 1982 M.S. with honors, Indian Institute of Technology, Kanpur
- 1977 H.S.C. with honors, Jai Hind College

### Brief Biographical Description

I have a dual training in physics and astrophysics. My Ph.D. was in computational 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 and the physics of accretion disks and I continue to work in all of those areas of research.

I have also played a seminal role in formulating of our new conception of computational astrophysics. My work on divergence-free AMR-MHD has led me to break new ground in our understanding of numerical MHD. 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. Several of my papers have been cited over a hundred times.

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 studies 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

### **Service to the Physics Department at Notre Dame**

- 2001 – 2002 Committee for Designing the SCF Cluster
- 2001 – 2002 Graduate Admissions Committee
- 2001 – 2002 Strategic Planning Committee for the Colloquy
- 2002 – 2003 Chair, Library Committee
- 2003 – 2004 Graduate Admissions Committee
- 2003 – 2004 Tablet PC Electronic Teaching Initiative
- 2004 – 2005 Graduate Admissions Committee
- 2005 – 2006 Graduate Admissions Committee
- 2006 – 2007 Computer & Qualifier Committees
- 2007 – 2008 Computer & Qualifier Committees

### Invited Talks in the Last Few Years

- 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. Of 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, 12<sup>th</sup> June 2002, Taiwan, Invited Talk: “Protostellar Core Collapse and Fragmentation Using AMR-MHD Simulations”.
- Workshop on Multidimensional Schemes, 18<sup>th</sup> June 2002, Bordeaux, France, Invited Talk: “Divergence-Free Adaptive Mesh Refinement for Magnetohydrodynamics”.
- IAU Symposium on Numerical Simulations in Astronomy, 5<sup>th</sup> July 2002, Tokyo, Invited Talk: “AMR-MHD in Computational Astrophysics”.
- 2<sup>nd</sup> annual IGPP Astrophysics Conference: Turbulence and the Interplanetary and Interstellar Medium, 9-12<sup>th</sup> 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, 2<sup>nd</sup> 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, 2009, 10<sup>th</sup> US National Congress on Computational Mechanics, Invited Talk : “ADER-WENO Schemes for Euler Flows and Divergence-Free MHD”

### **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

### **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, M.S. 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, M.S. granted 2006, University of Stuttgart ( in conjunction with C.D. Munz)
- Tobias Rumpf, 2008, University of Stuttgart ( in conjunction with C.D. Munz)

### **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-- , Univ. of Notre Dame
- D.Tilley, 2005-- , Univ. of Notre Dame
- O. Zannotti, 2007 -- , 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

### Refereed

- [1] **D.S. Balsara** & A. Brandt, Multilevel Methods for Fast Solution of N-Body and Hybrid Systems, Int. Ser. Num. Math., Vol. 98, Pg. 131 (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, Pg. 631 (1992).
- [3] R.A. Gerber, S.A. Lamb & **D.S. Balsara**, A Model for Ring Galaxies: Arp 147-like Systems, A.J. Lett., 399, L51 (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., 402, 109 (1993).
- [5] **D.S. Balsara**, Higher Order Schemes for Isothermal Hydrodynamics, Ap.J., 420,197 (1994).
- [6] **D.S. Balsara**, Riemann Solver for Relativistic Flow, J. Comput. Phys., 114, 284 (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., 430, 511 (1994).
- [8] **D.S. Balsara**, C. O’Dea & M. Livio, Galaxies in Clusters: Gas Stripping and Accretion, Ap. J., 437, 83 (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. (1994).
- [10] **D.S. Balsara**, von Neumann Stability Analysis of Smoothed Particle Hydrodynamics -- Suggestions for Optimal Algorithms, J. Comput. Physics, 121, 373 (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, 276, 345 (1996).
- [12] P.L. Roe & **D.S. Balsara**, Notes on the Eigensystem of Magnetohydrodynamics , SIAM Journal of Applied Mathematics, 56, 57 (1996).
- [13] **D.S. Balsara**, Wave Propagation in Molecular Clouds, Ap.J., 465, 775 (1996).
- [14] A. Suchkov, V. Berman **D.S. Balsara**, & T. Heckman, Mass Loading and Collimation of Galactic Superwinds, Ap.J., 463, 528 (1996).
- [15] **D.S. Balsara**, Linearized Formulation of the Riemann Problem for Adiabatic and Isothermal Magnetohydrodynamics, Ap.J. Supp., Vol. 116, 119 (1998).
- [16] **D.S. Balsara**, Total Variation Diminishing Algorithm for Adiabatic and Isothermal Magnetohydrodynamics, Ap.J. Supp., Vol. 116, 133 (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, accepted (1998).
- [18] **D.S. Balsara** & A. Pouquet, The Formation of Large-Scale Structures in Compressible MHD Flows, Phys. of Plasmas, Vol. 6, 89 (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.*, 149, 270 (1999).
- [20] **D.S. Balsara** & D. Spicer, Maintaining Pressure Positivity in MHD Flows, *J. Comput. Phys.*, 148, 133 (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), 617 (1999).
- [22] **D.S. Balsara**, Linearized Formulation of the Riemann Problem for Radiation Hydrodynamics, *J. Quant. Spectroscopy & Rad. Transf.*, Vol. 61 (#5), 629 (1999).
- [23] **D.S. Balsara**, The Eigenstructure of the Equations of Radiation Magnetohydrodynamics, *J. Quant. Spectroscopy & Rad. Transf.*, Vol. 61 (#5), 637 (1999).
- [24] **D.S. Balsara**, Linearized Formulation of the Riemann Problem for Radiation Magnetohydrodynamics, *J. Quant. Spectroscopy & Rad. Transf.*, Vol. 62, 167 (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, 255 (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, pg. 405 (2000).
- [27] **D.S. Balsara**, Total Variation Diminishing Scheme for Relativistic Magnetohydrodynamics, *Ap.J. Supp.*, Vol. 132, pg. 1 (2001).
- [28] **D.S. Balsara** & C.D. Norton, Highly Parallel Structured Adaptive Mesh Refinement Using Parallel Language-Based Approaches, *Journal of Parallel Computation*, 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.*, 557, 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, 715-720 (2001).
- [32] **D.S. Balsara**, Divergence-Free Adaptive Mesh Refinement for Magnetohydrodynamics, *J. Comput. Phys.*, Vol. 174(2), pp. 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, 800-805 (2001).
- [34] **D.S. Balsara**, Adaptive Mesh Refinement in Computational Astrophysics – Methods and Applications, *J. Korean Astronomical Society*, Vol. 34, pp. 181-190 (2001).
- [35] B.H. Liou & **D.S. Balsara**, An Implicit, Unstructured Adaptive Grid Approach for Compressible Flows with Moving Boundaries, *AIAA Paper 2001-0440* (2001).
- [36] 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, pp. 627-636, (2003).
- [37] **D.S. Balsara** & J.S. Kim, An Intercomparison Between Divergence-Cleaning and Staggered Mesh Formulations for Numerical Magnetohydrodynamics, *Ap.J.*, vol. 602, pp. 1079-1090, (2004).

- [38] **D.S. Balsara**, Second Order Accurate Schemes for Magnetohydrodynamics With Divergence-Free Reconstruction, *Ap.J.Supp.*, vol. 151(1), pp. 149-184, (2004).
- [39] M. Torrilhon & **D.S. Balsara**, High Order WENO Schemes: Investigations on Non-Uniform Convergence for MHD Riemann Problems, *J. Comp. Phys.* 201, 586-600, (2004).
- [40] **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, 339-349 (2004).
- [41] 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, 864-876 (2005).
- [42] **D.S. Balsara** & J.S. Kim, Amplification of Magnetic Fields by Supernova-Driven Turbulence, Part II – The Role of Dynamical Chaos, *Ap.J.* 634, 390-406, (2005).
- [43] J.L. Fisker & **D.S. Balsara**, Simulating the Boundary Layer Between a White Dwarf and its Accretion Disk, *Ap.J.Lett.*, 635, L69, (2005).
- [44] 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).
- [45] D.A. Tilley & **D.S. Balsara**, Anisotropic Thermal Conduction in Supernova Remnants: Relevance to Hot Gas Filling Factors in the Magnetized ISM, *ApJLett*, 645, L49-L52, (2006).
- [46] 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*, 371, 1106, (2006).
- [47] 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*, 653, 301, (2006).
- [48] A.Taub, M. Dumbser, **D.S. Balsara** & C.D. Munz, Arbitrary High Order Discontinuous Galerkin Schemes for the MHD Equations, *SIAM J. Scientific Computing*, 30(3), 441-461, (2007).
- [49] **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.*, 226, 586-620 (2007).
- [50] 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, *ApJLett*, 670, 29L (2007).
- [51] **D.S. Balsara**, D.A. Tilley & J.C. Howk , Thermal Conduction in Supernova Remnants I : Numerics and Evolution of Remnants, *Monthly Notices of the Royal Astronomical Society*, 386, 627 (2008).
- [52] **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*, 386, 642 (2008).
- [53] D.A. Tilley & **D.S. Balsara**, A Two-fluid Method for Ambipolar Diffusion, *Monthly Notices of the Royal Astronomical Society*, 389, 1058, (2008).
- [54] 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.*, 227, 8209-8253 (2008).
- [55] C. D'Andrea, J. Poirier, **D.S. Balsara**, Experimental data and analysis of the October 2003 Forbush decrease, *Advances in Space Research* 44, 1247-1251 (2009).

- [56] **D.S. Balsara**, T. Rumpf, M. Dumbser & C.-D. Munz, Efficient, High Accuracy ADER-WENO Schemes for Hydrodynamics and Divergence-Free Magnetohydrodynamics, in press *J. Comp. Phys.*, (2009).
- [57] **D.S. Balsara**, Fisker, J.L., Sion, E.M. & Godon, P., Simulations of the Boundary Layer Between a White Dwarf and its Accretion Disk, submitted *ApJ*, (2009). (astro-ph/0705.2582)
- [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, submitted, *Monthly Notices of the Royal Astronomical Society*, (2009).
- [59] **D.S. Balsara**, Divergence-free Reconstruction of Magnetic Fields and WENO Schemes for Magnetohydrodynamics, submitted, *J. Comp. Phys.*, (2009).
- [60] K.F. Gurski & **D.S. Balsara**, An Approximate Riemann Solver for Semirelativistic Magnetohydrodynamics, in preparation, *J. Comp. Phys.*, (2009).
- [61] **D.S. Balsara**, M. Dumbser & D.A. Tilley, ADER Schemes for Problems with Stiff Source Terms – Method and Application to Two-Fluid Magnetohydrodynamics, in preparation, *J. Comp. Phys.*, (2009).

### Unrefereed

- [1] 3D Hydrodynamical Simulations of Extragalactic Jets (with M.L. Norman), Ringberg Conference on Extragalactic Jets (1991).
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