

Contents

Part I Plenary Lectures

General Relativistic Hydrodynamics and Magnetohydrodynamics: Hyperbolic Systems in Relativistic Astrophysics

J.A. Font 3

On Approximations for Overdetermined Hyperbolic Equations

S.K. Godunov 19

Stable Galaxy Configurations

Y. Guo 35

Dissipative Structure of Regularity-Loss Type and Applications

S. Kawashima 45

Dissipative Hyperbolic Systems: the Asymptotic Behavior of Solutions

S. Bianchini, B. Hanouzet, and R. Natalini 59

Part II Invited Lectures

Higher Order Numerical Schemes for Hyperbolic Systems with an Application in Fluid Dynamics

V. Dolejší 77

A Penalization Technique for the Efficient Computation of Compressible Fluid Flow with Obstacles

G. Chiavassa and R. Donat 89

Contents

Exact Solutions to Supersonic Flow onto a Solid Wedge <i>V. Elling and T.-P. Liu</i>	101
Resonance and Nonlinearities <i>T. Gallouët</i>	113
L^p-Stability Theory of the Boltzmann Equation Near Vacuum <i>S.-Y. Ha, M. Yamazaki, and S.-B. Yun</i>	125
A Relaxation Scheme for the Two-Layer Shallow Water System <i>R. Abgrall and S. Karni</i>	135
Group Dynamics of Phototaxis: Interacting Stochastic Many-Particle Systems and Their Continuum Limit <i>D. Bhaya, D. Levy, and T. Requeijo</i>	145
Vacuum Problem of One-Dimensional Compressible Navier–Stokes Equations <i>H.-L. Li, J. Li, and Z. Xin</i>	161
Stability and Instability Issues for Relaxation Shock Profiles <i>C. Mascia</i>	173
A New hp-Adaptive DG Scheme for Conservation Laws Based on Error Control <i>A. Dedner and M. Ohlberger</i>	187
Elliptic and Centrifugal Instabilities in Incompressible Fluids <i>F. Gallaire, D. Gérard-Varet, and F. Rousset</i>	199
On Compressible Current–Vortex Sheets <i>Y. Trakhinin</i>	209
On the Motion of Binary Fluid Mixtures <i>K. Trivisa</i>	221
On the Optimality of the Observability Inequalities for Kirchhoff Plate Systems with Potentials in Unbounded Domains <i>X. Zhang and E. Zuazua</i>	233

Part III Mini-Symposium on Hydraulics

High Order Finite Volume Methods Applied to Sediment Transport and Submarine Avalanches <i>D. Bresch, M.J.C. Díaz, E.D. Fernández-Nieto, A.M. Ferreiro, and A. Mangeney</i>	247
On a Well-Balanced High-Order Finite Volume Scheme for the Shallow Water Equations with Bottom Topography and Dry Areas <i>J.M. Gallardo, M. Castro, C. Parés, and J.M. González-Vida</i>	259
A Simple Well-Balanced Model for Two-Dimensional Coastal Engineering Applications <i>F. Marche</i>	271
A Model for Bed-Load Transport and Morphological Evolution in Rivers: Description and Pertinence <i>A. Paquier and K. El Kadi</i>	285

Part IV Contributed Talks

Homogenization of Conservation Laws with Oscillatory Source and Nonoscillatory Data <i>D. Amadori</i>	299
Short-Time Well-Posedness of Free-Surface Problems in Irrotational 3D Fluids <i>D.M. Ambrose</i>	307
Mathematical Study of Static Grain Deep-Bed Drying Models <i>D. Aregba-Driollet</i>	315
Finite Volume Central Schemes for Three-Dimensional Ideal MHD <i>P. Arminjon and R. Touma</i>	323
Finite Volume Methods for Low Mach Number Flows under buoyancy <i>P. Birken</i>	331
Time Splitting with Improved Accuracy for the Shallow Water Equations <i>A. Bouchteïn and L. Bouchteïn</i>	339

Compact Third-Order Logarithmic Limiting for Nonlinear Hyperbolic Conservation Laws	
<i>M. Čada, M. Torrilhon, and R. Jeltsch</i>	347
A Finite Volume Grid for Solving Hyperbolic Problems on the Sphere	
<i>D. Calhoun, C. Helzel, and R.J. LeVeque</i>	355
Capturing Infinitely Sharp Discrete Shock Profiles with the Godunov Scheme	
<i>C. Chalons and F. Coquel</i>	363
Propagation of Diffusing Pollutant by a Hybrid Eulerian–Lagrangian Method	
<i>A. Chertock, E. Kashdan, and A. Kurganov</i>	371
Nonlocal Conservation Laws with Memory	
<i>C. Christoforou</i>	381
Global Weak Solutions for a Shallow Water Equation	
<i>G.M. Coclite, H. Holden, and K.H. Karlsen</i>	389
Structural Stability of Shock Solutions of Hyperbolic Systems in Nonconservation Form via Kinetic Relations	
<i>B. Audebert and F. Coquel</i>	397
A Hyperbolic Model of Multiphase Flow	
<i>D. Amadori and A. Corli</i>	407
Nonlinear Stability of Compressible Vortex Sheets	
<i>J-F. Coulombel and P. Secchi</i>	415
Regularity and Compactness for the DiPerna–Lions Flow	
<i>G. Crippa and C. De Lellis</i>	423
A Note on L^1 Stability of Traveling Waves for a One-Dimensional BGK Model	
<i>C.M. Cuesta</i>	431
The Weak Rankine Hugoniot Inequality	
<i>B. Després</i>	439
Numerical Investigations Concerning the Strategy of Control of the Spatial Order of Approximation Along a Fitted Gas–Liquid Interface	
<i>C. Dickopp and J. Ballmann</i>	449

Domain Decomposition Techniques and Hybrid Multiscale Methods for Kinetic Equations <i>G. Dimarco and L. Pareschi</i>	457
A Shock Sensor-Based Second-Order Blended (Bx) Upwind Residual Distribution Scheme for Steady and Unsteady Compressible Flow <i>J. Dobeš and H. Deconinck</i>	465
Artificial Compressibility Approximation for the Incompressible Navier–Stokes Equations on Unbounded Domain <i>D. Donatelli and P. Marcati</i>	475
Traveling-Wave Solutions for Hyperbolic Systems of Balance Laws <i>A. Dressel and W.-A. Yong</i>	485
A Hyperbolic-Elliptic Model for Coupled Well-Porous Media Flow <i>S. Erve and K.H. Karlsen</i>	493
High-Resolution Finite Volume Methods for Extracorporeal Shock Wave Therapy <i>K. Fagnan, R.J. LeVeque, T.J. Matula, and B. MacConaghy</i>	503
Asymptotic Properties of a Class of Weak Solutions to the Navier–Stokes–Fourier System <i>E. Feireisl</i>	511
A New Technique for the Numerical Solution of the Compressible Euler Equations with Arbitrary Mach Numbers <i>M. Feistauer and V. Kučera</i>	523
Monokinetic Limits of the Vlasov-Poisson/Maxwell-Fokker-Planck System <i>L. Hsiao, F. Li, and S. Wang</i>	533
High-Resolution Methods and Adaptive Refinement for Tsunami Propagation and Inundation <i>D.L. George and R.J. LeVeque</i>	541
Young Measure Solutions of Some Nonlinear Mixed Type Equations <i>H.-P. Gittel</i>	551
Computing Phase Transitions Arising in Traffic Flow Modeling <i>C. Chalons and P. Goatin</i>	559

Dafermos Regularization for Interface Coupling of Conservation Laws	
<i>B. Boutin, F. Coquel, and E. Godlewski</i>	567
Nonlocal Sources in Hyperbolic Balance Laws with Applications	
<i>R.M. Colombo and G. Guerra</i>	577
Comparison of Several Finite Difference Methods for Magnetohydrodynamics in 1D and 2D	
<i>P. Havlík and R. Liska</i>	585
On Global Large Solutions to 1-D Gas Dynamics	
<i>E.E. Endres and H.K. Jenssen</i>	593
A Carbuncle Free Roe-Type Solver for the Euler Equations	
<i>F. Kemm</i>	601
WENOCLAW: A Higher Order Wave Propagation Method	
<i>D.I. Ketcheson and R.J. LeVeque</i>	609
Unsteady Transonic Airfoil Flow Simulations using High-Order WENO Schemes	
<i>I. Klioutchnikov, J. Ballmann, H. Oliver, V. Hermes, and A. Alshabu</i>	617
The Predictor–Corrector Method for Solving of Magnetohydrodynamic Problems	
<i>T. Kozlinskaya and V. Kovenya</i>	625
A Central-Upwind Scheme for Nonlinear Water Waves Generated by Submarine Landslides	
<i>A. Kurganov and G. Petrova</i>	635
An A Posteriori Error Estimate for Glimm’s Scheme	
<i>M. Laforest</i>	643
Multiphase Flows in Mass Transfer in Porous Media	
<i>W. Lambert and D. Marchesin</i>	653
Nonlinear Hyperbolic–Elliptic Coupled Systems Arising in Radiation Dynamics	
<i>C. Lattanzio, C. Mascia, and D. Serre</i>	661
The Lagrangian Coordinates Applied to the LWR Model	
<i>L. Ludovic, C. Estelle, and L. Jorge</i>	671

**Hyperbolic Conservation Laws and Spacetimes
with Limited Regularity**

P.G. LeFloch 679

**Arbitrary Lagrangian–Eulerian (ALE) Method in Cylindrical
Coordinates for Laser Plasma Simulations**

M. Kucharik, R. Liska, R. Loubere, and M. Shashkov 687

**Numerical Aspects of Parabolic Regularization for Resonant
Hyperbolic Balance Laws**

M. Kraft and M. Lukáčová-Medvid'ová 695

**Three-Dimensional Adaptive Central Schemes on
Unstructured Staggered Grids**

A. Madrane 703

**High Amplitude Solutions for Small Data in Pairs of
Conservation Laws that Change Type**

V. Matos and D. Marchesin 711

**Asymptotic Behavior of Riemann Problem with Structure
for Hyperbolic Dissipative Systems**

A. Mentrelli and T. Ruggeri 721

**Maximal Entropy Solutions for a Scalar Conservation Law
with Discontinuous Flux**

S. Mishra 731

**Semidiscrete Entropy Satisfying Approximate Riemann
Solvers and Application to the Suliciu Relaxation
Approximation**

T. Morales and F. Bouchut 739

**On the L^2 -Well Posedness of an Initial Boundary Value
Problem for the Linear Elasticity in Two and Three
Space Dimensions**

A. Morando and D. Serre 747

**Intersections Modeling with a Class of “Second-Order”
Models for Vehicular Traffic Flow**

M. Herty, S. Moutari, and M. Rasle 755

**Some Contributions About an Implicit Discretization of a 1D
Inviscid Model for River Flows**

*A. Bermúdez de Castro, R. Muñoz-Sola, C. Rodríguez,
and M. Ángel Vilar* 765

Remarks on the Nonhomogeneous Oseen Problem Arising from Modeling of the Fluid Around a Rotating Body <i>S. Kračmar, S. Nečasová, and P. Penel</i>	775
Multi-D Bony Type Potential for the Boltzmann–Enskog Equation <i>S.-Y. Ha and S.E. Noh</i>	783
Convergence of Well-Balanced Schemes for the Initial Boundary Value Problem for Scalar Conservation Laws in 1D <i>M. Nolte and D. Kröner</i>	791
Stability for Multidimensional Periodic Waves Near Zero Frequency <i>M. Oh and K. Zumbrun</i>	799
Existence of Strong Traces for Quasisolutions of Scalar Conservation Laws <i>E.Y. Panov</i>	807
Path-Conservative Numerical Schemes for Nonconservative Hyperbolic Systems <i>C. Parés</i>	817
Numerical Modeling of Two-Phase Gravitational Granular Flows with Bottom Topography <i>M. Pelanti, F. Bouchut, A. Mangeney, and J.-P. Vilotte</i>	825
Linear Lagrangian Systems of Conservation Laws <i>Y.-J. Peng</i>	833
Normal Modes Analysis of Subsonic Phase Boundaries in Elastic Materials <i>H. Freistühler and R.G. Plaza</i>	841
Large Time Step Positivity-Preserving Method for Multiphase Flows <i>F. Coquel, Q.-L. Nguyen, M. Postel, and Q.-H. Tran</i>	849
Velocity Discretization in Numerical Schemes for BGK Equations <i>A. Alaia, S. Pieraccini, and G. Puppo</i>	857
A Space–Time Conservative Method for Hyperbolic Systems of Relaxation Type <i>S. Qamar and G. Warnecke</i>	865

A Numerical Scheme Based on Multipeakons for Conservative Solutions of the Camassa–Holm Equation <i>H. Holden and X. Raynaud</i>	873
Consistency of the Explicit Roe Scheme for Low Mach Number Flows in Exterior Domains <i>F. Rieper and G. Bader</i>	883
Weak and Classical Solutions for a Model Problem in Radiation Hydrodynamics <i>C. Rohde, N. Tiemann, and W.-A. Yong</i>	891
Spectral Analysis of Coupled Hyperbolic–Parabolic Systems on Finite and Infinite Intervals <i>J. Rottmann-Matthes</i>	901
Toward an Improved Capture of Stiff Detonation Waves <i>O. Rouch, M.-O. St-Hilaire, and P. Arminjon</i>	911
Generalized Momenta of Mass and Their Applications to the Flow of Compressible Fluid <i>O. Rozanova</i>	919
ADER–Runge–Kutta Schemes for Conservation Laws in One Space Dimension <i>G. Russo, E.F. Toro, and V.A. Titarev</i>	929
Strong Boundary Traces and Well-Posedness for Scalar Conservation Laws with Dissipative Boundary Conditions <i>B. Andreianov and K. Sbihi</i>	937
A Relaxation Method for the Coupling of Systems of Conservation Laws <i>A. Ambroso, C. Chalons, F. Coquel, E. Godlewski, F. Lagoutière, P.-A. Raviart, and N. Seguin</i>	947
Increasing Efficiency Through Optimal RK Time Integration of Diffusion Equations <i>F. Cavalli, G. Naldi, G. Puppo, and M. Semplice</i>	955
Numerical Simulation of Relativistic Flows Described by a General Equation of State <i>S. Serna</i>	963
On Delta-Shocks and Singular Shocks <i>V.M. Shelkovich</i>	971

Finite Dimensional Representation of Solutions of Viscous Conservation Laws	
<i>W. Shen</i>	981
A Moving-Boundary Tracking Algorithm for Inviscid Compressible Flow	
<i>K.-M. Shyue</i>	989
Transparent Boundary Conditions for the Elastic Waves in Anisotropic Media	
<i>I.L. Sofronov and N.A. Zaitsev</i>	997
Counterflow Combustion in a Porous Medium	
<i>A.J. de Souza</i>	1005
Global Attractor and its Dimension for a Klein–Gordon–Schrödinger System	
<i>M.N. Poulou and N.M. Stavrakakis</i>	1013
A Few Remarks About a Theorem by J. Rauch	
<i>F. Sueur</i>	1021
A Riemann Solver Approach for Conservation Laws with Discontinuous Flux	
<i>M. Garavello, R. Natalini, B. Piccoli, and A. Terracina</i>	1029
The Strong Shock Wave in the Problem on Flow Around Infinite Plane Wedge	
<i>D.L. Tkachev, A.M. Blokhin, and Y.Y. Pashinin</i>	1037
The Derivative Riemann Problem for the Baer–Nunziato Equations	
<i>E.F. Toro and C.E. Castro</i>	1045
Stability of Contact Discontinuities for the Nonisentropic Euler Equations in Two-Space Dimensions	
<i>A. Morando and P. Trebeschi</i>	1053
Three-Dimensional Numerical MHD Simulations of Solar Convection	
<i>S.D. Ustyugov</i>	1061
Large-Time Behavior of Entropy Solutions to Scalar Conservation Laws on Bounded Domain	
<i>J. Vovelle and S. Martin</i>	1069

**A Second-Order Improved Front Tracking Method for the
Numerical Treatment of the Hyperbolic Euler Equations**
J.A.S. Witteveen..... 1077

**Simulation of Field-Aligned Ideal MHD Flows Around
Perfectly Conducting Cylinders Using an Artificial
Compressibility Approach**
M.S. Yalim, D.V. Abeele, and A. Lani..... 1085

**Vanishing at Most Seventh-Order Terms of Scalar
Conservation Laws**
N. Fujino and M. Yamazaki..... 1093

**Large-Time Behavior for a Compressible Energy
Transport Model**
L. Hsiao and Y. Li..... 1101

Novel Entropy Stable Schemes for 1D and 2D Fluid Equations
E. Tadmor and W. Zhong..... 1111

Index..... 1121