Journal of Statistical Physics, Vol. 81, Nos. 1/2, 1995

Foreword

This issue of the *Journal of Statistical Physics* is devoted to lattice-based models and related topics. It contains papers presented at the Lattice Gas '94 Meeting held jointly with the 5th International Conference on Discrete Models for Fluid Mechanics which took place from June 27 to June 29, 1994, at Princeton University, Princeton, New Jersey. The organizing committee consisted of J. P. Boon (Brussels), H. Cabannes (Paris), G. D. Doolen (Los Alamos), D. d'Humières (Paris), A. Lawniczak (Guelph), S. A. Orszag (Princeton), Y. H. Qian (Princeton), and S. Succi (Rome).

The purpose of the meeting was to bring together applied mathematicians, physicists, chemists, fluid dynamicists, computer scientists, and engineers to discuss the state of the art of lattice-based techniques for fluid dynamics simulations. The focus was on recent advances in the theory, comparison with experiments and traditional CFD methods, new applications, and hardware architectures.

We were very happy to welcome about 90 participants from nine countries, which was double of what we had expected. About half of the participants came from Europe and Asia and half from America. There were 24 invited talks (30 minutes), 20 contributed talks (15 minutes), and eight posters. Leading scientists as well as young researchers presented their work on a very wide range of topics.

There was a round table discussion on the state of the art and future directions of research. There was also a conference dinner at which older scientists told the audience about their own exciting experiences of scientific research.

We thank Princeton University for providing the conference facilities and we are also very grateful to the generous financial supports of Exa Corporation and Mobil Company. The technical assistance of S. Matarese and D. Chrin was greatly appreciated.

J. L. Lebowitz (Rutgers University)
S. A. Orszag (Princeton University)
Y. H. Qian (Columbia University)

0022-4715/95/1000-0001$07.50/0

PROGRAM OF THE LATTICE GAS '94 MEETING AT PRINCETON

Invited Talks

1. S. Succi (IBM Rome): Lattice Boltzmann Computing: The Old Story and the New Perspectives

2. J. P. Boon (ULB, Brussels): Lattice Gas with Nonlocal Interactions

3. B. Alder (LLNL, Livermore): Particle Hydrodynamics

4. E. G. D. Cohen (Rockefeller): New Developments in Diffusion in Lorentz Lattice Gas Cellular Automata

5. M. Ernst (Utrecht): Long-Range Correlations and Non-Gibbsian States in LGA's

6. H. D. Chen (Exa, Cambridge): Recovery of Complete Hydrodynamics in Lattice Gas Models

7. J. L. Lebowitz (Rutgers): Shock Profiles in Lattice Models: Some Exact and Some Simulation Results

8. R. Gatignol (Paris): Boundary Conditions in Discrete Kinetic Theory and Applications

9. H. Cornille (Paris): Hexagonal Discrete Boltzmann Models With or Without Rest Particles

10. H. Cabannes (Paris): Exact Solutions for a Semicontinuous Model of the Boltzmann Equation

11. R. Löhner (George Mason Univ.): Some Recent Developments in CFD Based on Unstructured Grids

12. V. Yakhot (Princeton): Intermittency of Dissipation Rate in Turbulence

13. N. Margolus (MIT, Cambridge): Physical Modeling on CAM-8

14. K. Molvig (Exa, Cambridge): Digital Physics: A New Technology for Fluid Simulation

15. R. Squier (Georgetown Univ.): Evaluating Application-Specific Lattice-Gas Architectures Using Throughput vs. Cost

16. B. M. Boghosian (TMC, Boston): Correlations and Renormalization in Lattice Gases with Chemical Reactions

17. R. Kapral (Toronto): Internal Noise, Oscillations, Chaos, and Chemical Waves

18. A. Lawniczak (Guelph): Fluctuations and Chemical Waves in Bistable Reacting System

19. S. Y. Chen (LANL, Los Alamos): Growth Kinetics in Multicomponent Fluids

20. G. D. Doolen (LANL, Los Alamos): Trends and Opportunities in Lattice Gas Research

21. R. Dorfman (Univ. Maryland): Chaos and Diffusion in Lorentz Lattice Gases

22. W. Matthaeus (Delaware Univ.): Comparison of Spectral Method and Lattice Boltzmann Simulation of Two-Dimensional Turbulence

23. P. Lavalle Montreal): Simulation of Properties of Elastic Solids with Lattice Gases

24. D. d'Humières (Paris): Lattice Gas Models and Lattice Boltzmann Equations for Flows in Viscoelastic Media

Contributed Talks

1. H. T. Yau (Courant): Incompressible Limit of Discrete Velocity Model

2. B. T. Nadiga (LANL, Los Alamos): Steady Supersonic Flow in a Discrete-Velocity Gas

3. K. Xu (Princeton): Hydrodynamical Simulations from BGK Model

4. F. R. Petruccione (Freiburg): A Master Equation Representation of Statistical Fluid Mechanics: Two-Dimensional Turbulence

5. H. D. Chen (Exa, Cambridge): An H-Theorem Without Semi-Detailed Balance

6. J. Olson (MIT, Cambridge): Simulation of Sheared Phase Separation: Measurement of Enhanced Effective Viscosity

7. C. Appert (Paris): Prediction of Surface Tension and Equilibrium Densities in a Lattice Gas Undergoing a Liquid-Phase Separation

8. D. Grubert (NLfβ-GGA, Germany): First Steps Towards a Description of Tracer Dispersion in Porous Media by Means of Lattice Gases

9. S. Cornell (Geneva): Cellular Automata Modeling of Reaction–Diffusion Phenomena

10. T. Karapiperis (PSI, Switzerland): Cellular Automaton Model of Coupled Mass Transport and Chemical Reactions

11. F. Wang (Rockefeller Univ.): Diffusion in Honeycomb and Quasi Lorentz Lattice Gas

12. A. Belmonte (Princeton): Turbulence in a Box

13. M. Zagarola (Princeton): SuperPipe: A High Reynolds Number Turbulent Pipe Flow Experiment

14. D. Sharvts (Rochester Univ.): Bubble Dynamics Model for Hydrodynamically Unstable Interfaces

15. H. F. Meng (Rockefeller Univ.): Catalytic Interface Erosion

16. G. McNamara (LANL, Los Alamos): Thermal Lattice Boltzmann Simulation of Convective Flows

17. X. W. Shan (LANL, Los Alamos): Lattice Boltzmann Model for Nonideal Gases and Their Mixtures

18. L. Wagner (Ohio State): Lattice Boltzmann Simulations of Laminar and Turbulent Flow Past a Cylindrical Obstacle

19. J. Yepez (Phillips Lab): Crystallization in a Lattice Gas with Multiple Fixed-Range Interactions

20. V. Borue (Princeton): Turbulence Simulations Using Hyperviscosity

Round Table Discussions

Poster Presentations

1. C. Appert (ENS, Paris), J. Olson, and D. Rothman (MIT): Scaling Laws and Growth Exponents for the Demixion of Two Immiscible Lattice Gases

2. H. J. Bussemaker and M. H. Ernst (Univ. of Utrecht): Correlations in LGA's Violating Detailed Balance

3. Y. Chen, H. Ohashi, and M. Akiyama (Univ. of Tokyo): Thermal Lattice Bhatnagar–Gross–Krook Model without Nonlinear Deviations in Macrodynamic Equations

4. N. Foster and D. Metaxas (Univ. of Pennsylvnia): Visualization of Dynamic Fluid Simulations: Waves Splashing, Vorticity, Buoyancy

5. R. Takahashi, Y. Matsukuma, and Y. Saito (Tokyo Inst. Technology): An Application of LGA to Shock Tube Problem and Mixed Flow

6. M. L. Tan, Y. H. Qian, and S. A. Orszag (Princeton): Lattice BGK Approach to Simulating Granular Flows

7. C. Teixeira (Exa Corp.): Simulation Validations of Digital Physics

8. K. Traub (Exa Corp.): An Engineering Fluid CAD Environment Based on Digital Physics