AMERICAN PHYSICAL SOCIETY
Division of Plasma Physics and
Topical Group on Computational Physics

THE 13TH CONFERENCE ON THE NUMERICAL SIMULATION OF PLASMAS

Hilton Hotel
Santa Fe, New Mexico, USA
September 17-20, 1989

SUNDAY EVENING, 7:30 - 9:30 PM SEPTEMBER 17, 1989

Registration — Mesa C

Cocktail Party — Chamisa

MONDAY MORNING, 7:30 AM, SEPTEMBER 18, 1989

Registration — Promenade Hall

MONDAY MORNING, 8:30 AM, SEPTEMBER 18, 1989

Introduction and Welcome (5 minutes) — R. Mason

Session IM — Mesa A, B — B. Godfrey, Chairman

Special Invited Talk (50 minutes)

IM5 Computing Environment of the Future; *D. W. Forslund*

Invited Talks (25 minutes) - New Developments in Plasma Simulation Methods

IM1 Slow Wave Device Modelling using the Virtual Particle Method; *J. W. Eastwood and T. C. Hender*

IM2 Concurrent PIC Codes and Dynamic Load Balancing on the JPL/Caltech Mark III Hypercube; *P. C. Liewer, E. W. Leaver, V. K. Decyk and J. M. Dawson*

IM3 Methodology of the BFCPIC Code based on Boundary-Fitted Coordinates and its Application to Ion Diodes; *T. Westermann*

IM4 3 Dimensional Particle Code for Strongly Coupled Plasmas and Contact Potential and Surface Tension between Different Hot Dense Plasmas; *K. Nishihara, H. Furukawa, M. Kawaguchi, H. Sakagami, T. Hiramatsu, and H. Yasui*

IM5 Numerical Simulation of the Space-Time Evolution of a 2-D Finite Extent Plasma; *Ph. Ravier and P. Louvet*

IM6 Multitasking the 3D Electromagnetic PIC Code QUICKSILVER; *D. B. Seidel, M. L. Kiefer, R. S. Coats, T. D. Pointon, J. P. Quintenz and W. A. Johnson*

IM7 A Wavenumber-in-cell Simulation of Langmuir turbulence; *J. Trulsen and H. L. Pécseli*

MONDAY AFTERNOON 2:00 - 4:00 PM, SEPTEMBER 18, 1989

PMA Mixed Poster Session — Mesa C and Aspen

PMA1 Hybrid Simulation of the Formation of Structure on the Surface of a Plasma; *A. G. Sgro and S. P. Gary*

PMA2 Optimization of Flux Corrected Transport Algorithms by the "Modified Equation" Method; *N. Grandjouan*

PMA3 Divergence-Free Poloidal Magnetic Diffusion in Two-Dimensional Eulerian Magneto-hydrodynamics; *R. L. Bowers and T. A. Oliphant*

PMA4 A Variational Approach to Adiabatic Plasma; *A. Eydeland, A. Lifschitz, J. Spruck and B. Turkington*

PMA5 Three-Dimensional Equilibria and Mercier Stability Calculations; *V. E. Lynch, N. Dominguez, B. A. Carreras, A. Varias, C. Alejaldre and A. L. Fraguas*

PMA6 Visualizing Data Produced by 3D, Electromagnetic, Particle-In-Cell Codes; *M. L. Kiefer, D. B. Seidel, R. S. Coats, J. P. Quintenz, T. D. Pointon, and W. A. Johnson*

PMA7 Parallel Implementation of a Laser Fusion Fluid Code on an IBM 3090-400 Vector Multiprocessor; *S. Atzeni*

PMA8 Particle Simulation on the NCUBE Concurrent Multiprocessor; *R. W. Huff and J. M. Dawson*

PMA9 Temporal and Spatial Filtering Remedies for Dispersion in Electromagnetic Particle Codes; *P. Rambo, J. Ambrosiano, A. Friedman, and D. E. Nielsen, Jr.*

PMA10 A Darwin model with guiding center electrons suitable for high β plasmas; *J. L. Geary, R. Holdaway, and R. A. Smith*

PMA11 Finite Element Particle Methods; *J. W. Eastwood*

PMA12 Multi-Scale Particle Simulation of Bounded Plasmas; *S. E. Parker, A. Friedman, S. L. Ray, and C. K. Birdsall*

PMA13 Simulation of Drift Wave Turbulence: Trapped Structures and a New Nonadiabatic Electron Model; *J. A. Crotinger*

PMA14 A Fully electromagnetic Hybrid Model for High Density Plasma Simulations; *M. E. Jones, V. A. Thomas, R. J. Mason and D. Winske*

PMA15 An Implicit Electric Field Algorithm for Quasineutral Hybrid Plasma Simulation; *A. Mankofsky, T. M. Antonsen, Jr., and A. T. Drobot*

PMA16 Solution of Wave Propagation Equations across Ion Cyclotron Resonance Layers; *K. Imre, D. C. Stevens, H. Weitzner*

PMA17 Current Collection in a Spacecraft Wake; Scaling from Chamber to Space with two Computer Codes; *D. L. Cooke, M. F. Tautz, C. Chan, M. A. Morgan and J. Browning*

PMA18 A 1-2/2-D Eulerian Vlasov code for the numerical simulation of laser beat wave interaction in a magnetized plasma; *P. Bertrand, A. Ghizzo, M. Shoucri, M. Feix, E. Fijalkow and T. W. Johnston*

PMA19 A Semi-analytical Technique for Driven Plasma Oscillation Analysis; *V. G. Molinari, P. Peerani and M. Sumini*

PMA20 Inclusion of Photon Production and Transport and (e^+ e^-) Pair Production in a Particle-in-Cell Code for Astrophysical Applications; *M. E. Sulkanen and G. R. Gisler*

PMA21 Flip MHD: A Particle-in-Cell Method for Magnetohydrodynamics; *J. U. Brackbill*

PMA22 An Explicit, Energy Conserving Method for the Reduced MHD Equations; *R. Betti*

MONDAY EVENING, 7:30 - 9:30 PM, SEPTEMBER 18, 1989

PMB **Mixed Poster and Post-Deadline Session** — Mesa C and Aspen

PMB1 Dense Z-Pinch Dynamics via Particle Simulation; *M. Kress, and W. Grossmann*

PMB2 Relativistic FCT Codes for Plasma Simulations; *C. B. Wallace and D. W. Harmony*

PMB3 Finite Element Calculations of Magnetic Field Diffusion; *C. W. Nielson and T. A. Oliphant*

PMB4 The Stability of the High-Density Z-Pinch; *A. H. Glasser*

PMB5 MHD Simulation with Resistive Boundary and DC Helicity Injection; *Y. L. Ho*

PMB6 Implementation of the BFCPIC Code on Vector and Massively Parallel Computers; *T. Westermann, M. Alef and D. Seldner*

PMB7 Solution of the Fokker-Planck Equation in a Massively Parallel Environment; *A. A. Mirin*

PMB8 Comparison of a 2-D Finite β Gyrokinetic Simulation in Slab Geometry on Serial and Parallel Computers; *J. V. W. Reynders and W. W. Lee*

PMB9 Simulation of a Cross Field Amplifier with Realistic Secondary Emission; *K. Eppley and K. Ko*

PMB10 Methods for PIC Simulation of Bent Particle Beams in 3d and 2d; *A. Friedman*

PMB11 Bounded Plasma Device Simulation with PDW1, including: External RLC Circuit DC and RF Drive, and Collisional Processes; *I. J. Morey, J. P. Verboncoeur, and V. Vahedi*

PMB12 3D Animations of Particles and Fields in the QN3D Plasma Simulation Code; *C. L. Anderson, D. V. Anderson, D. E. Shumaker, E. J. Horowitz and D. Porter*

PMB13 Adaptive Time-Step Scheme for Particle Simulation: 2D-EM Non-Radiative Implementation and Applications to the Pinch Modeling; *A. Tarditi*

PMB14 Adaptive Simulation of Wave Collapses in Nonlinear Schroedinger Equation; *N. E. Kosmatov, V. F. Shvets, V. E. Zakharov*

PMB15 A Comparison of Solution Techniques for Strongly Coupled 2D Partial Differential Equations; *D. J. Larson, D. W. Hewett, and D. V. Anderson*

PMB16 Resistive Block Methods for Electrostatic Field Solutions with Internal Elements; *E. Nielsen, Jr., and J. J. Ambrosiano*

PMB17 Deterministic methods for particle diffusion; *G. Russo*

PMB18 A Non-Periodic Euler-Vlasov Code for the Numerical Simulation of Laser-Plasma B Wave Acceleration and Raman Scattering; *P. Bertrand, A. Ghizzo, T. W. Johnst M. Shoucri, E. Fijalkow, M. R. Feix*

PMB19 A fully implicit orbit averaged simulation of high-power relativistic electron be propagation in atmosphere; *A. Piquemal and J-J Bouyer*

PMB20 Rapid Heat Flow in the Standard One-Dimensional Particle model; *W. S. Lawson P. C. Gray*

PMB21 Simulation of the Rayleigh-Taylor Instability in Colliding, Ablatively-Driven La Targets; *J. Dahlburg, J. Gardner and M. Emery*

PMB22 A Quasilinear Fokker-Plank Code for the Numerical Solution of the Lower-Hyb Current Drive Problem in the Presence of Electron Cylotron Heating; *M. Shoucri Shkarosfsky, V. Fuchs, K. Kupfer, A. Bers and S. Luckhardt*

PMB23 FCT and Projection Methods for Lagrangian Methods; *P. M. Velarde*

PMB24 Simulation of Transport of Optical Beams in Plasmas; *T. Kurki-Suonio and T. Tap*

Tuesday Morning 8:30 AM, September 19, 1989

Session IT —Mesa A, B — A. Mankofsky, Chairman

Special Invited Talk (50 minutes)

ITS Neural Networks with Memory for Intelligent Computations; *Y. C. Lee*

Invited Talks (25 minutes) - Applications of Plasma Simulations

IT1 A 3-D Magnetostatic Particle Code (BUCKSHOT) In the Paraxial Limit for Study Relativistic Electron Beam Propagation; *J. S. Wagner*

IT2 Beam Evolution and Emittance Growth Calculations for Cylindrically Symme Beams with Space Charge; *Robert D. Ryne*

IT3 Particle Simulation of Fluid Models of Drift-Wave Turbulence; *W. Arter and J. Eastwood*

IT4 Improved Gyrokinetic Particle Simulation Techniques; *T. J. Williams, B. I. Co and R. Sydora*

IT5 Particle Model for 3D Langmuir Collapse Simulation; *A. I. D'yachenko, A. N. Push A. M. Rubenchik and V. F. Shvets*

IT6 Hybrid Simulations of a Curved Shock; *V. A. Thomas and D. Winske*

Tuesday Afternoon 1:30 - 3:30 PM, September 19, 1989

PT Mixed Poster Session — Mesa C and Aspen

PT1 Simulations of $\vec{E}$ x $\vec{B}$–Drifting Plasma Clouds with the Dielectric-in-Cell and N-Body–Dielectric Techniques; *J. E. Borovsky and P. J. Hansen*

PT2 Vortex-In-Cell Calculation in Three Dimensions; *S. H. Brecht*

PT3 Flexible Semi-Implicit Algorithm for 3-D MHD Simulations; *R. C. Bishop, D. C. Barnes, P. R. Shapiro and D. D. Schnack*

PT4 The Evolution of a Sheared Potential Magentic Field in the Solar Corona; *J. T. Karpen, S. K. Antiochos and C. R. DeVore*

PT5 Numerical Simulation of Tokamak Plasma Dynamics using the Four-Field Model; *E. Uchimoto and H. R. Strauss*

PT6 WinGraphics: An Optimized Windowing Environment for Interactive Real-Time Simulations; *J. P. Verboncoeur and V. Vahedi*

PT7 NTRFACE An Object-Oriented Interface System for PIC Codes; *N. T. Gladd*

PT8 An Efficient Spectral Algorithm for Guiding Center Simulations in Cylindrical Coordinates; *E. A. Coutsias, F. R. Hansen, T. Huld and J. P. Lynov*

PT9 The Effects of Anode Plasma Physics on Ion Diode Performance; *T. D. Pointon*

PT10 Particle boundary conditions for outward flow; *A. B. Langdon*

PT11 The Traveling-Wave-Tube Code IBC; *I. J. Morey and C. K. Birdsall*

PT12 Particle Simulation of Confined Plasmas in Curvilinear Coordinates; *M. J. LeBrun and T. Tajima*

PT13 Numerical Aspects of 2D MHD Turbulence Simulations; *D. Biskamp and H. Welter*

PT14 Implicit 2D Multi-Fluid Hybrid Plasma Simulation; *R. J. Mason*

PT15 Simulation of Kinetic Magnetic Reconnection Processes in Two Dimensions; *K. M. Ling and J. M. Wallace*

PT16 Semi-Implicit MHD Operators for Highly Nonuniform Plasmas; *Z. Mikić*

PT17 Practical Aspects of a 2-D Edge-Plasma Model; *M. E. Rensink, D. N. Hill, G. D. Porter and B. J. Braams*

PT18 Simulations of Critical Velocity Ionization in a Pulsed Beam; *S. T. Lai, W. J. McNeil and E. Murad*

PT19 Calculation of Current Drive Efficiencies in Tokamaks with Non-Circular Flux Surfaces; *M. G. McCoy, R. S. Devoto, R. W. Harvey and G. D. Kerbel*

PT20 Long-Time Behavior of Numerically Computed Orbits: Intermediate Timestep Analysis; *S. P. Auerbach and A. Friedman*

PT21 Massive Parallelization in Plasma Turbulent Transport Computations; *G. D. Kerbel and R. E. Waltz*

Tuesday Afternoon 3:30 - 4:00 PM, September 19, 1989

Business Meeting Mesa A — R. J. Mason, Chair

Tuesday Evening, September 19, 1989

Open Bar — Poolside; 6:00 PM — no host

Banquet — Mesa B, C; 7:00 PM

Dinner Talk

Frank Harlow — New Mexico: An Aesthetic View

Wednesday Morning 8:30 - 11:30 AM, September 20, 1989

Session IW — Mesa A, B — D. Anderson, Chairman

Invited Talks (25 minutes) – Modeling of Fluids and Fields

IW1 Tools for Three-Dimensional MHD Equilibrium Configuration Studies; *J. L. Johnson, D. Monticello, N. Pomphrey and A. H. Reiman*

IW2 An Electromagnetic Finite Element Particle Code on an Unstructured Grid; *J. Ambrosiano and R. Löhner*

IW3 Numerical Simulation of Hydrodynamic Instabilities in Laser Targets; *J. Gardner, J. Dahlburg, M. Emery and R. DeVore*

IW4 Plasma Dynamics in Electrothermal Gun Cartridges; *B. W. Swanson*

IW5 3-D MHD with 2 Fluid Effects; *R. A. Nebel, K. L. Sidikman, J. Staudenmeier and R. Veerasingam*

IW6 Activities and Plans of the National Magnetic Fusion Energy Computer Center; *A. A. Mirin*

Wednesday 11:30 AM - 1:30 PM, September 20, 1989

PW Mixed Poster Session — Mesa C and Promenade Hall

PW1 Hybrid Particle-Fluid Approach to Low-Frequency Turbulence in Magnetically Confined Plasmas; *J. N. Leboeuf, R. H. Fowler, J. H. Han and P. M. Lyster*

PW2 Plasma Injection Along Magnetic Field Lines in the PBFA-II Plasma Opening Switch; *M. H. Frese*

PW3 Calculation of Axisymmetric Stability of Tokamak Plasmas with Active and Passive Feedback; *D. J. Ward, S. C. Jardin and C. Z. Cheng*

PW4 A Numerical Model for Electron Cylotron Heating Profiles in Stellarator Geometry; *R. C. Goldfinger and D. B. Batchelor*

PW5 Many-Electron Effects on Dynamic Processes in Dense Matter; *S. M. Younger*

PW6 Automatic Rezoning of 2-D Lagrangian Meshes, with Application to Laser Fusion Codes; *S. Atzeni*

PW7 A 2D Electrostatic PIC Code for the Mark III Hypercube; *R. D. Ferraro, P. C. Liewer and V. K. Decyk*

PW8 Comparison of Particle Orbit Algorithms for Interactions with Intense Electromagnetic Waves; *T. D. Rognlien*

PW9 Application of the 3-D, Electromagnetic, PIC Code QUICKSILVER; *J. P. Quintenz, R. S. Coats, M. L. Kiefer, D. B. Seidel, T. D. Pointon and W. A. Johnson*

PW10 An Algorithm for Particle Reflection from Internal Boundaries on Orthogonal Uniform Meshes; *D. W. Hewett, H. L. Rutkowski and S. Humphries, Jr.*

PW11 PDC1: One Dimensional Radial Code for a Cylindrical Plasma Device with an External RLC Circuit; *M. V. Alves, V. Vahedi and C. K. Birdsall*

PW12 Particle Simulation of Ion Cyclotron Waves in a Plasma with Nonuniform Magnetic Field; *S. Qian and M. K. Hudson*

PW13 Coherent Phase Space Structures in One Dimensional Electrostatic Plasma; *N. D. Suh, P. Mineau, P. Bertrand and M. R. Feix*

PW14 Algorithms for Time-Implicit Collisional Plasma Simulation; *J. Denavit, and P. W. Rambo*

PW15 Boundary Integral Methods for Static and Dynamic Field Calculations; *D. C. Barnes*

PW16 Comparison of Particle-In-Cell and Fokker-Planck Methods as Applied to the Modeling of Auxiliary-Heated Mirror Plasmas; *R. J. Procassini, C. K. Birdsall, B. I. Cohen and Y. Matsuda*

PW17 Approximation of the Grad-Schlüter equation with free boundary by finit differences; *R. Meyer-Spasche, B. Fornberg and D. Lortz*

PW18 A Particle-In-Cell Method for Modeling Small Angle Coulomb Collisions in Plasmas; *S. E. Parker*

PW19 Ultra-Fast Numerical Solutions to the Transport Equations using Variational Techniques; *J. P. Freidberg, P. Hakkarainen, and E. Chaniotakis*

PW20 The Interaction of Intense Laser Pulses; *P. Sprangle, E. Esarey and A. Ting*