

Plasma Theory and Simulation Group List of Publications for 1997-2004

Journal Articles

- J. P. Verboncoeur, "Symmetric spline weighting for charge and current density in particle simulation", *J. Comp. Phys.* **174**, 421-427 (2001).
- Y. Ikeda, K. Suzuki, H. Fukomoto, M. Shibata, M. Ishigaki, J. P. Verboncoeur, P. J. Christenson, and C. K. Birdsall, "Global breakdown in an alternating current plasma display panel", *J. Appl. Phys.* **89**, 4231-4239 (2001).
- K. M. Rantamaki, K. M. Alm-Lytz, T. J. H. Pattikangas, S. J. Karttunen, J. P. Verboncoeur, and P. Mardahl, "Electromagnetic Particle-In-Cell Simulations of a Lower Hybrid Grill", submitted to *Comput. Phys. Comm.* (2001).
- D. L. Bruhwiler, R. Giacone, J. R. Cary, J. P. Verboncoeur, P. J. Mardahl, E. Esarey, and W. Leemans, "Particle-In-Cell Simulations of Plasma Accelerators and Electron-Neutral Collisions", *Physical Review ST Accelerators and Beams* **4**, 10132 (2001).
- H. J. Lee and J. P. Verboncoeur, "Simulation of a positive column discharge with a one-dimensional radial radiation transport coupled particle-in-cell model", *J. Appl Phys.* **90** (10), 4957 (2001).
- H. J. Lee and J. P. Verboncoeur, "A radiation transport coupled particle-in-cell simulation. Part I: Description of the model", *Phys. Plasmas* **8** (6), 3089 (2001).
- H. J. Lee and J. P. Verboncoeur, "A radiation transport coupled particle-in-cell simulation. Part II: Simulation results in 1-D planar model", *Phys. Plasmas* **8** (6), 3089 (2001).
- W. Qiu, H. J. Lee, J. P. Verboncoeur, and C. K. Birdsall, "A time domain circuit simulator for coupled-cavity traveling wave tubes", *IEEE Trans. Plasma Science* **29**, (6), 911-920, (2001).
- E. Kawamura and J. H. Ingold, "Particle-in-cell simulations of low pressure small radius positive column discharges", *Journal of Physics D: Applied Physics* **34** (21), 3150-3163, (Nov. 2001).
- K. Bowers, "Slow Phase Velocity Electron Surface Waves in Unmagnetized Bounded Plasmas: Part I: Modeling. Physics of Plasmas. Submitted February 2001. Revised September 2001.
- K. Bowers, "Slow Phase Velocity Electron Surface Waves in Unmagnetized Bounded Plasmas: Part II: Simulation. Physics of Plasmas. Submitted February 2001. Revised September 2001.
- K. Bowers, "Implicit Methods for Solving the Maxwell Equations Suitable for Low Temperature Particle-In-Cell Plasma Simulation", *Journal of Computational Physics*. Submitted January 2001.
- K. Bowers, "Accelerating a Particle-In-Cell Simulation with a Hybrid Counting Sort", *Journal of Computational Physics* **173**, 393-511 (2001).
- K. Cartwright, P. Christenson, J. Verboncoeur and C.K. Birdsall, "Surface Wave Enhanced Collisionless Transport in a Bounded Crossed-field Non-neutral Plasma," *Physics of Plasmas (Special Issue)*, vol. 7, No. 5, Pt. 2, pp.1740-1745 (May 2000).
- K.L. Cartwright, J.P. Verboncoeur and C.K. Birdsall, "Loading and Injection of Maxwellian Distributions in Particle Simulations," *Jour. Comp. Phys.* **162**, pp.483-513 (2000).
- K.L. Cartwright, P.J. Christenson, J.P. Verboncoeur and C.K. Birdsall, "Dominant Characteristics of One-Dimensional Magnetically Insulated Crossed Field Electron Flow with Space Charge Limited Emission," submitted to *Phys. Plasmas* (2000).

- K.L. Cartwright, P.J. Christenson, J.P. Verboncoeur and C.K. Birdsall, "Nonlinear Hybrid-Boltzmann Particle-in-Cell Acceleration Algorithm," *Phys. Plasmas* **7**, pp.3252-3264 (2000).
- E. Kawamura, C.K. Birdsall and V. Vahedi, "Physical and Numerical Methods of Speeding Up Particle Codes and Paralleling as Applied to RF Discharges," *Plasma Sources Science and Technology* **9**, pp.413-428 (2000).
- H. Usui, J.P. Verboncoeur and C.K. Birdsall, "Development of 1D Object-Oriented Particle-in-Cell Code (1d-XOOPIC)", *IEICE Transactions on Electronics* **83**, pp.989-992
- J.P. Verboncoeur and G.J. Parker, "Kinetic Modeling of Collision Rates in an AC Plasma Display Panel Cell," to be submitted to *J. Appl. Phys.* (2000).
- J.P. Verboncoeur, "Initiation of Breakdown in a 3-electrode Plasma Display Panel Cell," to be submitted to *J. Appl. Phys.* (2000).
- T.M. Antonsen, Jr., A.A. Mondelli, B. Levush, J.P. Verboncoeur, and C.K. Birdsall, "Advances in Modelling and Simulation of Vacuum Electronic Devices," *Special Issue of Proc. IEEE on New Vistas for Microwave Electronic Devices, Vol. 87, No. 5*, May 1999
- K.L. Cartwright, P.J. Christenson, and J.P. Verboncoeur, "Series-Resonance Oscillations in Crossed Field Space-Charge Limited Electron Flow," Submitted to *Phys. Rev. Letters*, May 18, 1999
- V.P. Gopinath, J.P. Verboncoeur and C.K. Birdsall, "Multipactor Electron Discharge Physics Using an Improved Secondary Emission Model," *Physics of Plasmas* **5(5)**, pp. 1535-1540, May 1998.
- V.P. Gopinath and B.H. Vanderberg, "Reduction of Crossed-Field Diode Transmitted Current Due to Anode Secondary Emission," *Physics of Plasmas* **5 (1)**, pp. 261-265, January 1998.
- D.J. Cooperberg, "Electron Surface Waves in a Plasma Slab with Uniform Ion Density," *Physics of Plasmas* **5 (4)**, pp. 853-862, April 1998.
- D.J. Cooperberg, "Electron Surface Waves in a Nonuniform Plasma Slab," *Physics of Plasmas* **5 (4)**, pp. 862-872, April 1998.
- D.J. Cooperberg and C.K. Birdsall, "Series Resonance Sustained Plasmas in a Metal Bound Plasma Slab," *Plasma Sources Sci. Technology* **7**, May, pp. 96-113, 1998.
- D.J. Cooperberg and C.K. Birdsall, "Surface Wave Sustained Plasmas in a Metal Bound Plasma Slab," *Plasma Sources Sci, Technology* **7**, February, pp. 41-53, 1998.
- C.K. Birdsall and J.P. Verboncoeur, "On the Fly PIC-MCC Demonstrations", *Czechoslovak Journal of Physics*, Vol. 48 (1998), Suppl. S2
- P.S. Mardahl and J.P. Verboncoeur, "Charge Conservation in Electromagnetic PIC Codes; Spectral Comparison of Boris/DADI and Landon-Marder Methods," *Computer Physics Communications* **106**, pp. 219-229, November, 1997.
- C.K. Birdsall, Comments on "The Pure Electron Discharge and It's Application in Radio Telegraphy & Telephony," *Proc. IEEE* **85**, No. 9, Sept. 1997, pp. 1493-1495.
- V. Vahedi and G. DiPeso, "Simultaneous Potential and Circuit Solution for Two-Dimensional Bounded Plasma Simulation Codes," *J. Comp. Phys.* **131**, pp. 149-163, June, 1997. (Work begun at U.C. Berkeley)

Book Chapter

- J. K. Lee and J. P. Verboncoeur, "Plasma Display Panel", in *Low Temperature Plasma Physics*, ed. R. Hippler, S. Pfau, M. Schmidt, and K. H. Schoenback, Wiley-VCH, 367-384 (2001).

- J. Benford, F. J. Agee, D. Gobel, F. Hegeler, K. J. Hendricks, R. M. Gilgenbach, C. Grabowski, H. Jory, and J. P. Verboncoeur, "Pulse Shortening", in *Advances in High Power Microwave Sources and Technologies*, ed. R. J. Barker and E. Schamiloglu, IEEE Press, New York, N.Y., 77-115.
- J. W. Luginsland, T. A. Antonsen, Jr., J. P. Verboncoeur, R. W. Lemke, L. Ludeking, P. M. Mardahl, A. T. Lin, Y. Y. Lau, and J. D. Blahovec, Jr., "Computational Techniques", in *Advances in High Power Microwave Sources and Technologies*, ed. R. J. Barker and E. Schamiloglu, IEEE Press, New York N.Y., 376-437 (2001).
- J.K. Lee and J.P. Verboncoeur, "Plasma Display Panel", in *Lectures on Plasma Physics and Plasma Technology*, ed. S. Pfau, M. Schmidt, R. Hippler and K.H. Schoenbach, Wiley-CVH (2000).
- J.P. Verboncoeur, Contributed to two chapters, "Pulse Shortening and Improved High Vacuum Techniques," and "Modeling and Computational Techniques," in *Advances in High Power Microwave Sources and Technologies*, ed. R.J. Barker and E. Schamiloglu, IEEE Press (in press for 2000).
- John Verboncoeur and Peter Mardahl, on the topic of progress in high-energy microwave sources, Editors: Edl Schamiloglu and Robert Barker, June 1999
- C.K. Birdsall, "Pioneering in Plasma Simulation", *Dynamical Systems, Plasmas and Gravitation*, Editors: P.G.L. Leach, S.E. Bouquet, J.-L. Rouet, E. Fijalkow, 1999
- C.K. Birdsall, Emi Kawamura and Vahid Vahedi, "Particle Simulation Methods for Glow Discharges: Past Present and Future, with Applications," *Electron Kinetics and Applications of Glow Discharges, Volume 367, NATO Advanced Science Institutes Series, 1998, from "NATO Advanced Research Workshop on Electron Kinetics and Applications of Glow Discharges", St Petersburg, Russia, 19-23 May 1997, pp. 59-74.*
- C.K. Birdsall, "Particle-in-Cell Monte Carlo Collision Codes (PIC-MCC); Methods and Applications to Plasma Processing," *Plasma Processing of Semiconductors, 1997, from the Proceedings of the NATO Advanced Study Institute on Plasma Processing of Semiconductors, Chateau de Bonas, France, 17-28 June 1996, pp. 277-289.*

ERL Reports

- E. Kawamura, J.P. Verboncoeur, and C.K. Birdsall, "Modeling Field Enhancement in an RF Gap," Memo No. UCB/ERL M00/22 (May 18, 2000).
- Marisa Roberto, "Effect of Metastable Atoms in RF Argon-discharges," Memo No. UCB/ERL M00/23 (May 19, 2000).
- Marisa Roberto, "A Monte Carlo Collision Model to Study RF Discharges with a Mixture of Argon and Oxygen," Memo No. UCB/ERL M00/24 (May 19, 2000).
- D.J. Cooperberg and C.K. Birdsall, "Plasmas at the Edge, Part I." Memo No. UCB/ERL, M98/31, June 1, 1998.

Talks, Posters, Papers

APS/DPP, October 2001, Long Beach, CA

- D. Dimitrov, D. Bruhwiler, W. Leemans, E. Esarey, P. Catravas, C. Toth, B. Shadwick, J. Cary, R. Giacone, J. Verboncoeur, and P. Mardahl, "Particle-in-Cell Simulations of Gas Ionization by Short Intense Laser Pulses", *Bull. Am. Phys. Soc.* 46 (2001).

- B. Cluggish, T. Okhawa, J. Verboncoeur, and D. Hua, "Modeling the electrode-plasma interaction in the Archimedes Plasma Mass Filter", *Bull. Am. Phys. Soc.* 46 (2001).
- R. E. Giaconne, J. R. Cary, D. Bruhwiler, E. Esarey, W. P. Leemans, B. A. Shadwick, O. Mardahl, and J. P. Verboncoeur, "Quality Particle Beams by Laser Injection into Plasma Accelerators using Colliding Pulses", *Bull. Am. Phys. Soc.* 46 (2001).
- K. Bowers, invited talk "Surface Waves and Landau Resonant Heating in Unmagnetized Plasmas", *Bull. Am. Phys. Soc.* 46 (2001).

ICOPS, June 18-22, 2001, Las Vegas, NV

- J. P. Verboncoeur, "A Digital Filtering Scheme for Particle Codes in Curvilinear Coordinates", 28th IEEE ICOPS, Las Vegas, NV (2001).
- W. D. Qiu, J. H. Lee, J. P. Verboncoeur, C. K. Birdsall, "A Time-Domain 1D Kirchhoff-PIC Code for Coupled Cavity Traveling Wave Tubes", 28th IEEE ICOPS, Las Vegas, NV (2001).
- H. J. Lee, J. P. Verboncoeur, H. B. Smith, E. Kawamura, C. K. Birdsall, "Self-Consistent Particle-in-Cell Simulation of Positive Column Discharge Including Radiation", 28th IEEE ICOPS, Las Vegas, NV (2001).
- H. J. Lee, P. Mardahl, G. Penn and J. Wurtele, "One-Dimensional PIC Simulation of Ultrashort Laser Pulse Amplification in a Plasma by a Counter-Propagating Pump", 28th IEEE ICOPS, Las Vegas, NV (2001).
- C. K. Birdsall, "Advances in 2d, 3d PIC Simulations and Beam Physics", Plenary invited talk, 28th IEEE ICOPS, Las Vegas, NV (2001).

Particle Accelerator Conference, 2001, Chicago, IL

- D. Bruhwiler, D. Dimitrov, W. Leemans, E. Esarey, B. Shadwick, P. Catravas, J. Cary, R. Giacone, J. Verboncoeur, and P. Mardahl, "Particle-in-Cell Simulations of Gas Ionization by Short Intense Laser Pulses", *2001 Particle Accelerator Conference*, Chicago, IL (2001).
- R. E. Giacone, J. R. Bruhwiler, E. Esarey, W. Leemans, P. Mardahl, and J. P. Verboncoeur, "Simulations of electron injection into plasma wake fields by colliding laser pulses using XOOPIE," *Proc. 2001 Particle Accel. Conf.* **5**, 4023-4025 (2001).

AIP Conf. Proc. 569

- D. L. Bruhwiler, R. Giacone, J. R. Cary, J. P. Verboncoeur, P. Mardahl, E. Esarey and W. Leemans, "Modeling Beam-Driven and Laser-Driven Concepts, AIP Conf. Proc. 569, ed. P. L. Colestock and S. Kelley, AIP, Melville NY, 591-604 (2001).

17th International Conference on the Numerical Simulation of Plasmas, May 22-24, 2000, Banff, Alberta, Canada

- C.K. Birdsall, Session II chair, Tuesday, May 23, 2000.
- K.L. Cartwright, J.P. Verboncoeur and C.K. Birdsall, "Loading and Injection of Maxwellian Distributions in Particle Simulations." (poster)
- J.P. Verboncoeur and K.L. Cartwright, "Radical Correction Factors for Source Terms in Particle Simulation." (poster)

IEEE International Conference on Plasma Science, (ICOPS) June 4-7, 2000, New Orleans, Louisiana

- K.J. Bowers and W. Qiu, "Modeling of Transient Effects in Resonant Discharges."
 K.L. Cartwright and J.P. Verboncoeur, "Simulation of Pulse Shortening in a Relativistic Klystron Oscillator."
 Hae June Lee, J.P. Verboncoeur, H.B. Smith, G.J. Parker and C.K. Birdsall, "A Coupled Radiation Transport Particle-in-Cell Model for Fluorescent Lamp Discharges."
 P.J. Mardahl, J.P. Verboncoeur, C.K. Birdsall, "Progress on a 3d Particle-in-Cell Model of a W-Band Klystron."
 Weiguang D. Qiu, J.P. Verboncoeur and C.K. Birdsall, "PIC-circuit Hybrid Model for Coupled Cavity Traveling Wave Tubes."
 H.B. Smith, J.P. Verboncoeur, W. Qiu and C.K. Birdsall, "Low Frequency Noise in a Couple-Cavity Traveling Wave Tube."

NRL-SAIC Meeting, Invited Talk, January 13, 1999, Washington, D.C.

- John Verboncoeur, P.J. Christenson, and K.L. Cartwright, "Progress on Ion Noise Particle Simulations"

IEEE Nuclear and Plasma Sciences Society (Oakland-East Bay Chapter), Invited Talk, March 16, 1999, Berkeley, CA

- C.K. Birdsall, "Plasmas and Plasma Simulation Using Many Particles"

IEEE International Conference on Plasma Science, (ICOPS) June 20-24,1999, Monterey, CA

- Kevin J. Bowers (with David W. Qiu, H.B. Smith and C.K. Birdsall), "Resonances and Surface Waves in Bounded Plasmas" *Invited*
 Kevin J. Bowers, "2D Electromagnetic PIC-MCC Simulation of the Initiation of a Large Area Surface Wave Sustained Plasma Source"
 Kevin J. Bowers., "Electrostatic and Electromagnetic Surface Wave Theories Compared"
 Kevin J. Bowers, David W. Qiu, and C.K. Birdsall, "Resonant Discharges: Initiation and Steady State; Comparisons with Theory, Simulation and Experiment"
 K.L. Cartwright, J.P. Verboncoeur, and C.K. Birdsall, "Analysis of self-force error in relativistic PIC simulations"
 Peter Mardahl and John Verboncoeur, "Progress on a 3d particle-in-cell model of a W-band klystron"
 H.B. Smith, K.J. Bowers, and C.K. Birdsall, "Resonant Discharge Simulations with Asymmetric Electrodes"

APFA & APPTC Conference, July 5-7,1999, Seoul, Korea

- Charles K. Birdsall, Kevin J. Bowers, Weiguang Qiu, and Helen B. Smith, "Simulations of resonant-surface-wave plasma (RSWP) discharges suitable for large-area plasma processing"

Workshop on Nonneutral Plasmas, August 2-6,1999, Princeton, NJ

- K.L. Cartwright, P.J. Christenson, J.P. Verboncoeur, and C.K. Birdsall, "Series-Resonance Oscillations in Pure Electron Plasmas"

International Centre for Theoretical Physics (ICTP), Autumn College on Plasma Physics, October 25-November 19, 1999, Trieste, Italy

C.K. Birdsall and John Verboncoeur, short course on “Designing and implementing many-particle and hybrid particle-fluid simulations,” November 8-12, 1999

Division of Plasma Sciences (DPP/APS), November 15-19,1999, Seattle, WA

Y. Ikeda, J.P. Verboncoeur, P.J. Christenson, and C.K. Birdsall, “Global modeling of a dielectric barrier discharge in Ne-Xe mixtures for an alternating current plasma display panel”, Journal of Applied Physics, September, 1999.

Numerical Simulation of Plasmas (ICNSP), 10-12 February, 1998, Santa Barbara, CA

Emi Kawamura, C.K. Birdsall and V. Vahedi, “Methods in Speeding Up PIC-MCC Codes Applied to RF Plasma Discharges.”

M.M. Turner, “Kinetic-Fluid Calculation of Electron Heating in Inductive Discharges.”

J.P. Verboncoeur, “XOOPIC: Progress in Object-Oriented Particle Simulation”

P.J. Mardahl and J.P. Verboncoeur, “Progress in Parallelizing XOOPIC.”

K.L. Cartwright, J.P. Verboncoeur and C.K. Birdsall, “Nonlinear Hybrid Boltzmann-PIC Acceleration Scheme.”

High-Power Microwave Third Annual Review, MURI Conference, 10-11 May, 1998, Monterey, CA

J.P. Verboncoeur, “June 1, 1998 MURI Quarterly Progress Summary.”

1998 IEEE International Conference on Plasma Science, (ICOPS) June 1-4, Raleigh, NC

P.J. Christenson, Y. Ikeda, J.P. Verboncoeur and K.L. Cartwright, "PIC Modeling of a 3-Electrode AC Plasma Display Panel."

J.P. Verboncoeur, "Initiation of Breakdown in a 3-Electrode Plasma Display Panel Cell."

K.L. Cartwright and C.K. Birdsall, "Nonquasineutral Theory of Ion-Acoustic Resonances in Bounded Nonuniform Plasmas and Comparison with PIC Simulations."

International Conference on Crossed Field Devices and Applications (CFDA), June 17-19, 1998, Northeastern University, Boston, Massachusetts

P.J. Christenson, K.L. Cartwright and J.P. Verboncoeur, “Effects of Voltage Fluctuations at the Cathode on Brillouin Flow.”

K.L. Cartwright, P.J. Christenson, J.P. Verboncoeur and C.K. Birdsall, “Oscillations in Space-Charge Limited Electron Flow.”

Y.Y. Lau, Peggy Christenson, Allen L. Garner and David Chernin, “Collapse of Cycloidal Electron Flows in a Crossed Field Gap.”

Edge-Plasma Theory and Simulation Workshop, “Edge Physics:” Integrated Modeling for Fusion and Industrial Plasmas”, Innsbruck, Austria, July 6-8, 1998

D.P. Cooperberg and C.K. Birdsall, “Sheath Waves, Unmagnetized.” (invited paper)

At the end of all three days, J.P. Verboncoeur and C.K. Birdsall presented “Simulation Demonstration Sessions” with “on-the-fly” simulations pertaining to the talks during that day. To be sure, there was some advance preparation. These sessions attracted almost the whole attendance of about 75 people.

Edge-Plasma Simulation Course, Innsbruck, July 9-10, 1998.

Taught by John P. Verboncoeur and Charles K. Birdsall. July 9th was the Basic Course and July 10th was the Advanced Course, where attendees had submitted projects and were promised first runs on July 10th - achieved! Attendees from nine countries.

51st Annual Gaseous Electronics Conference & 4th International Conference on Reactive Plasmas, October 19-23, 1998, Maui, Hawaii

Kevin Bowers, "Electromagnetic Electron Surface Waves in a Non-Uniform Thermal Plasma."

Kevin Bowers and C.K. Birdsall, "Resonant Discharge Simulation; Comparisons with Theory and Experiment."

Emi Kawamura and C.K. Birdsall, "Paralleling and Other Methods Speeding Up Particle Codes Applied to RF Plasma Discharges."

APS Centennial Talk, November 23, 1998, San Francisco State University, San Francisco, California

C.K. Birdsall, "Plasma and Plasma Simulation Using Many Particles."

40th Annual Meeting, American Physical Society, Division of Plasma Physics, November 16-20, 1998, New Orleans, LA

P.J. Christenson, K.L. Cartwright, P.J. Mardahl, and J.P. Verboncoeur, "Hybrid PIC Acceleration Schemes for PDPs."

J.P. Verboncoeur and P.J. Mardahl, "Progress on a Three-Dimensional Extension of the Particle Code XOOPIC."

K.L. Cartwright, P.J. Christenson, J.P. Verboncoeur and C.K. Birdsall, "Collapse of Cycloidal Flow in 2d Crossed Field Gaps."

NRL, invited talk to Vacuum Electronics Section, 23 Jan, 1997, Washington DC

C.K. Birdsall, "Microwave Tube Research at U.C. Berkeley"

- (a) Sensitivity of stability of crossed-field diodes to quality of emission
- (b) Possible role of ions in TWT's, Varian/CPI problems, with demonstration using the Berkeley OOPIC code
- (c) Some advantages of "Large C" TWT's. (some history)
- (d) Virtual Cathode Oscillations, for those who have never seen them.

NRL, invited talk to Plasma Physics Section, 24 Jan, 1997, Washington DC

C.K. Birdsall, "Plasma Surface Waves, from Noise and Driven Resonant Discharges".

1997 NATO Advanced Research Workshop on "Electron Kinetics and Applications to Glow Discharges", 19-23 May, St. Petersburg, Russia, invited talk

C.K. Birdsall, "Particle Simulation Methods for Glow Discharges: Past, Present and Future, with Applications."

IEEE Conference on Plasma Science, 19-22 May, 1997, San Diego, CA

J.P. Verboncoeur, "Simulation of a Plasma-Focused Electron Gun." (talk)

D.J. Cooperberg and C.K. Birdsall, "High Frequency Series Resonance and Surface Wave Sustained Discharges." (talk)

- J.M. Oslake, J.P. Verboncoeur and C.K. Birdsall, "Numerical Cold Testing for Plasma Loaded Slow-Wave Circuits." (poster)
- P.J. Christenson, "Simulations of Modulational and Resistive Instabilities in Cylindrical Crossed-Field Diodes." (poster)
- K.L. Cartwright, J.P. Verboncoeur, C.K. Birdsall, "Hybrid PIC Acceleration Schemes for Discharges." (poster)
- H. Gunnell, J.P. Verboncoeur, N. Brenning and S. Torven, "Narrow, Stationary and Stable Electric Field Spikes Produced by an Electron Beam in an Inhomogenous Plasma."

23-24 May, Conférence en l'honneur de Marc Felix et de ses contributions à la Physique, les Mathématiques et la Simulation Numérique, 1997, Orleans, France, invited talk
C.K. Birdsall, "Pioneering Plasma Simulation."

International Symposium on Plasma and Flow Simulation for Materials Processing, 10-12 July 1997, Institute of Fluid Science, Tohoku University, Sendai, Japan, invited talk
C.K. Birdsall, E. Kawamura and V. Vahedi, "Progress in Speeding Up PIC-MCC Codes Applied to RF Plasma Discharges."

Workshop on Nonneutral Plasmas 1997, 29 July - 1 August, 1997, University of Colorado, Boulder, CO

- C.K. Birdsall, "Particle Simulation of Surface Waves."
- K.L. Cartwright, J.P. Verboncoeur, V.P. Gopinath and C.K. Birdsall, "Relaxation of Virtual Cathode Oscillations Due to Transverse Effects in a Crossed-Field Diode."

Conference on "Plasma Simulation: Past, Present and Future", 29-31 July, 1997, Los Alamos National Laboratory

- Emi Kawamura, "Progress in Speeding Up PIC-MCC Codes Applied to RF Plasma Discharges."

Quatrieme Ecole d'Ete du GdR SPARCH, Sept. 15-19, 1997, St. Pierre d'Oleron, France

- John P. Verboncoeur, "Simulation of Diodes and Microwave Beam Devices," (invited paper)

Gaseous Electronics Conference, Oct. 6-9, 1997, Madison, Wisconsin

- J.P. Verboncoeur, P.J. Christenson and K.L. Cartwright, "Breakdown in a 3-Electrode AC Plasma Display Panel Cell." (talk)
- P.J. Christenson, Y. Ikeda, J.P. Verboncoeur and K.L. Cartwright, "Modeling of a 3-Electrode AC Plasma Display Panel." (poster)
- E. Kawamura, C.K. Birdsall and V. Vahedi, "Attempts to Make Particle Codes Approach Fluid Code Speeds Applied to RF Plasma Discharges." (talk)

Short Course, Oct. 13 - Oct. 31., International Center for Theoretical Physics, Trieste, Italy, (Course for Third World Professionals)

- C. K. Birdsall and Dr. Peggy Christenson, "Plasma Simulation."

APS Division of Plasma Physics, Nov. 17 - 21, 1997, Pittsburg, PA

J.M. Oslake, J.P. Verboncoeur and C.K. Birdsall, "Frequency Domain Numerical Model for Slow Wave Dispersion Using Single Period Structures."

K. Cartwright, J.P. Verboncoeur, P.J. Christenson and C.K. Birdsall, "Hybrid P/C Acceleration Scheme for Discharges."

P. Mardahl and J. P. Verboncoeur, "Progress in Parallelizing XOOPIC."

Visitors to PTSG 1997:

Dr. Hide Usui, from Radio Atmospheric Science Center, University of Kyoto, Uji, Japan as a sponsored

Japanese Overseas Research Fellow, supported by the Ministry of Education, Science, Sports and Culture,

Japan. March 31, 1997 - March 30, 1998. To learn our 2d 3v codes.

Dr. Yuichi Ikeda, Visiting Industrial Fellow from Hitachi Research Labs, Hitachi-chi, Japan. April 1-

September 30, 1997. Worked on Plasma Display Panel Physics, using our OOPIC 2d 3v code.