

Dennis Papadopoulos
CURRICULUM VITAE
January, 25, 2014

Current Position:

- Professor, Departments of Physics and Astronomy, University of Maryland, College Park
- Co-director, East West Space Science Center (**EWSSC**)

Education:

- B.Sc., Physics, University of Athens, Greece (1960)
- M.Sc., Nuclear Engineering, MIT (1965)
- Ph.D., Physics, University of Maryland (1968)

Society Elections:

- Fellow, American Physical Society (**APS**, 1975)
- Fellow, The Washington Academy of Science (**WAS**, 1979)
- Corresponding Member, International Academy of Astronautics, (**IAA**, 2004)

Notable Scientific Awards:

- Navy Meritorious Civilian Service Award (1976) (Highest scientific award conferred by NRL)
- E.O. Hulbert Award for Outstanding Scientific Achievement (1977)
- The Washington Academy of Science Award for Scientific Achievement in the Physical Sciences (1978)
- The NASA Certificate of Commendation for Distinguished Service to Space Sciences (1986)
- The NASA Group Achievement Award (1998)

Authorship/Presentations:

- Published over 265 refereed scientific journals (see attached)
- 7 U.S. Patents and 1 pending patent (see attached)
- Over 140 invited lectures in National and International meetings (see attached)
- Edited two books (see attached)
- h-index50 (Google)

Other Honors:

- Chairman, Gordon Conference on Space Plasmas, 1979.
- Vice Chairman, Gordon Conference on Space Plasmas, 1978.
- Co-Chairman, International URSI-IAGA, Joint Group on "Space Plasmas", 1975-1978.
- Member, APS Fellowship Committee, (1977-1980)
- Correspondent "Comments on Plasma Physics" (1984-2000)
- Associate Editor, Journal of Geophysical Research (1981-1984)
- Editor, Plasma Physics Series, Cambridge University Press (1989-2000)

Service and Professional Membership:

- Member, Space Earth Science Advisory Committee (SESAC), (The Senior NASA Advisory Committee for the Office of Space and Applications), 1984-1987.
- Science Advisor, Office for Fusion Energy, Applied Physics Program 1978-1979
- Member, Space Science Board, Committee on Solar and Space Physics, National Academy of Sciences, 1983-1986
- Member Committee on the role of high power, high frequency band transmitters in advancing ionospheric/thermospheric research, National Research Council, National Academy of Sciences, 2013.
- Member, Keyworth Briefing Committee on Space Physics, 1984.
- Member, Research and Analysis Review Committee, NASA, 1984.
- Member, Maxwell Prize Committee for Plasma Physics, APS, 1988.
- Member, Executive Committee Division of Plasma Physics (DPP), American Physical Society (APS), 1985-1988.
- Member, Program Committee DPP-APS, 1985, 1986, 1989.
- Member, Space Station Planning Committee on Plasma and Fusion Physics, 1985.
- Member, Space Plasma Physics and Astrophysics Panel, Physics Review Committee, National Academy of Sciences, 1983-1984.
- Chairman, Steering Committee “Assessment of the Status of Solar Terrestrial Physics”, 1982-1983.
- Member, N.A.S.A., “Space Plasma Theory Panel”, 1978.
- Member, Overview Committee, D.O.E., A.P.P. 5 year plan, 1980, 1985.
- Member, N.A.S.A., Advisory Panel on “Computer Simulations in Space Plasma”, 1977.
- AIP Physics New Committee, 1979.
- Member, Sigma-X, Honorary.
- National Academy of Science, NRC Postgraduate Advisor
- U.S. Delegate, I.A.E.A. Fusion Conference, 1971, 1974, 1976, 1978.
- Member, Working Group “Electron Beam Experiments on the AMPS Program”.
- Organizing Committee, “N.C. Christophilos International Summer School and Conference on Plasma Physics”, Spetses, Greece, 1977.
- Convener, “Symposium on Wave Instabilities in Space Plasmas”, URSL XIX General Assembly, Helsinki, 1978
- Member, Program Committee “Mediterranean School on Plasma Astrophysics”, 1985.
- Committee on Future Direction of HAARP, Chair Tony Tether, Director of DARPA (2001)
- Chairman, Committee on Scientific Program Using HAARP
- Member, Investigator Working Group the Tether Satellite Program
- Member, Council on Foreign Relations “The Study Group on United States Space Posture for 21st Century”, 2003
- Member, Committee on Terrorism and the Nuclear Question, Eisenhower Institute, 2003

- Member Committee on the role of High-Power, High-Frequency-Band Transmitters in advancing Ionospheric/Thermospheric Research. National Research Council, National Academy of Sciences, 2013.

Educational Service:

- Supervised 17 Ph.D. theses. Currently supervising three more
- Supervised 25 post-doctoral associates.
- Member School of Computational Physics, Advisory Board, George Mason University, 2003
- Reviewer Interdisciplinary Ph.D. Program in the Physical Sciences George Mason University, 2003

Major Competitive PI Selections:

- NASA Space Plasma Physics Theory Program- \$ 1.4 M (1980-1986)
- NASA International Solar Terrestrial Program – PI Theory & Simulations – \$ 7.9 M (1990-2002)
- NASA Tethered Satellite Systems (TSS)- Theory and Simulations – \$ 8 M (1987-1994)
- NASA CRESS – Theory and Simulations - \$ 2.5 M (1989 – 1993)
- ONR – MURI on Radiation Belts - \$ 7.5 M (2006-2011)
- AFOSR – MURI “Mobile HF Sources for Ionospheric Modifications” - \$ 7.5 (2013-2018) [Co-PI]

Citations:

The 265 research articles published by Prof. Papadopoulos have been cited over 8000 times (Google Scholar). His h-index is 50.

Overview of Notable Research Accomplishments:

Prof. Papadopoulos research spans several decades and covers the following areas:

- (i) The Physics of high Mach number collisionless shocks
- (ii) Active experiments that use space as a non-linear plasma laboratory
- (iii) Beam-plasma instabilities including non-linear stabilization, collapse and radiation signatures with application to type III radio-bursts and the aurora
- (iv) Virtual low frequency antenna driven by modulated HF heating of the ionosphere
- (v) Anomalous transport in the laboratory and space
- (vi) Magnetospheric global space weather modeling and prediction
- (vii) Laser plasma interactions and applications to switching, THz radiation and medical imaging
- (viii) The physics of high altitude lightning

His research accomplishments include:

- a) Initial prediction and demonstration of spontaneous magnetic fields ($>MG$) in laser produced plasmas
- b) The first analysis of non-linear beam plasma interactions that includes strong Langmuir turbulence and radiation effects (Resolution of “Sturrock’s dilemma”)
- c) First analysis of ionospheric generation of ELF/ULF waves by ionospheric heating that does not require the presence of electrojet currents
- d) First self-consistent analysis of the Critical Ionization Velocity (CIV) effect
- e) First resolution of the physics that allows high ($2 < M_A < 20$) and super-high ($M_A > 20$) Mach number collisionless shock waves
- f) First self consistent model of artificial ionization using high power ionospheric heaters
- g) Comprehensive analysis of anomalous plasma transport effects in space plasmas
- h) Introduction of 3D global MHD simulations with applications to space weather and major space missions

The Physics of High Mach Number Collisionless Shock Waves:

A critical plasma physics issue, since the discovery of the earth’s bow shock in the late 50s, was the microphysics that allowed its existence in a collisionless environment. Early work focused on anomalous resistivity but this could not explain the observed shocks at Mach numbers above two. During the period 1979-1985, Prof. Papadopoulos led a group of theoretical/computational physicists and data analysts, that using satellite observation and newly developed hybrid codes provided the physics foundations of high Mach number collisionless shock waves that are currently used in magnetospheric physics and astrophysics. The work emphasized the critical role played by the ions reflected from the shock and of the ubiquitous magnetic overshoot in setting up the kinetic interactions,, necessary to produce quasi-stationary high Mach number shocks [Pub.72,82;cit.167,37]. An extension of this work was the physics of super-high Mach number shocks ($M_A > 25$) such as the ones observed in supernova remnants. The model remains the standard model in astrophysics [Pub135; cit.140]. Prof. Papadopoulos overall work on collisionless shocks has been extremely influential as evidenced by the more than 1300 of citations of his work on the subject. It should be moreover noted that the use of major computations by his Space Plasma Physics group in 1978 was the first to introduce major simulation programs in space plasma physics.

Active plasma experiments in space:

Prof. Papadopoulos work has been extremely influential in the area of active plasma physics experiments, in which electron, ion and neutral beams, as well as high power radio waves were injected in space to study their interaction with the space plasma. In addition to participating in the experiments he developed key theoretical models that explored the physics of neutral gas-plasma interaction, including an understanding of Alfvén’s Critical Ionization Velocity (CIV) hypothesis [Pub.110], the theory of the Beam Plasma Discharge (BPD), the propagation of energetic ion beams in space and the physics controlling collisionless coupling of neutral gas with the magnetospheric plasma. He was selected as PI and participated in the design and analysis of NASA’s Tethered

Satellite System (TSS) mission, in which a 20 km conducting tether was released from the space shuttle upwards to study the interaction of high $V \times B$ driven voltage (5 kV) with the ionospheric magneto-plasma and determine its I/V characteristics (Classic Langmuir problem). More recently he focused on active experiments using high-power ionospheric heaters and he was instrumental in promoting the HAARP facility in Alaska that is currently the premier heater in the world. HAARP has been the first facility to produce artificial plasmas at altitudes between 150-280 km, with densities exceeding the plasma density of its natural ionosphere [Pub.261]. The new development has important implications in trans-ionospheric VHF/UHF and ground-to-ground HF communications and Over the Horizon Radar (OTH) applications.

Strong turbulence theory of beam-plasma interactions with applications to type III radio-bursts and the aurora:

Prof. Papadopoulos conducted numerous groundbreaking investigations in the area of electron beam-plasma interactions and their radiative manifestations. The original work was motivated by the so-called “Sturrock’s dilemma” related to Solar type III type radio bursts. Observations indicated that electron beams generated near the Sun were causing radiation in the plasma frequency and its harmonic while propagating over distances of 1 AU. Conventional quasi-linear beam-plasma instability theory predicted that will form a plateau and stop radiating within 20-50 km. To address the paradox he reformulated the basic weak turbulence beam-plasma theory [Pub.21, 27; cit.137, 108] introducing strong Langmuir turbulence effects and demonstrating that they would replace the exponential loss of energy due to instabilities by a low loss friction-like effect that allowed the beams to propagate over large distance while emitting the observed type III radiation. In addition to type III bursts the theory was applied and explained the reasons that relativistic beam heating of plasmas was extremely inefficient [Publ.II.15] and predicted that similar interaction will produce super-thermal tails in the auroral zone. The theoretical predictions were instrumental in guiding mission measurements such as the NASA ULYSSES and STEREO missions. The in situ measurements [Pub.203, 259] confirmed the theoretical model expanded in [Pub. 21,27]. A corollary of the analysis [Pub. 20] predicted that that strong Langmuir turbulence should be observed in the auroral regions and was the cause of auroral power law electron tails. These predictions were confirmed in a recent PRL [Isham et al., PRL, 2012] almost 50 years later. Prof. Papadopoulos papers in this area were cited over 1300 times.

Virtual Antenna (VA) at ULF/ELF/VLF frequencies Using HF Heating of the Ionosphere:

At ULF/ELF/VLF (.01Hz-20 kHz) frequencies, traditional dipole antennas are extremely inefficient and require very long wires. Since the early 70s Prof. Papadopoulos has been exploring the possibility of taking advantage of the active properties of the ionospheric plasma (that supports currents systems known as electrojets and inverted density gradients) and using HF (3-10 MHz) heating to down-convert the HF waves to the ULF/ELF/VLF frequencies by linear or nonlinear plasma processes. The low frequency waves can then be injected in the earth-ionosphere waveguide and used for applications such as underwater communications [Patents 1,4,6] and underground imaging [Patent 2] or in the Radiation Belts (RB) where they can as whistler or Alfvén waves where their

can be used the physics of wave-particle interactions and possibly provide techniques that can reduce the flux of trapped energetic particles that are deleterious to lifetime of satellites. His work has been instrumental to the development of the HAARP facility in Alaska, the premier ionospheric heater in the world. The experiments verified the old concept, known as Polar Electrojet Antenna (PEJ) (refs) of modulating electrojet currents flowing in the plasma at 80-100 km altitudes. He, furthermore, developed and successfully tested a new technique, known as Ionospheric Current Drive (ICD) that does not rely currents, but drives a diamagnetic current by periodic heating the F-region. As a result Virtual Antenna using ICD can be placed anywhere is needed for RB or other applications. The success of these experiments led to a new MURI program initiated this year to construct small portable antennas with the University of Maryland as the leading institution. Novel techniques to explore the physics of wave-particle interactions in the RB are now possible using Virtual Antennas to inject whistler or Alfvén waves in the RB and study the interaction physics using instruments on the numerous overflying satellites. The widespread interest in this new and innovative technique is evidenced by the 7 invited talks in international meeting he presented during the past year [Presentations 1,3,4,7-9]. His research in the area resulted in improved concepts on submarine communications and underground imaging for oil and mineral resources. Prof. Papadopoulos papers on the subject were cited more than 600 times.

Anomalous Transport:

Prof. Papadopoulos was a pioneer in using a combination of theory and simulations to develop anomalous transport coefficients for use in global models in space plasma physics settings, such as the auroral zones, reconnection, solar flares and shocks. Starting with extensive studies and particle simulations of various key instabilities, such as the Buneman, counter-streaming ion and lower hybrid instability he developed algorithms that allowed their effects to be modeled as transport coefficients in numerical and semi-analytic models. Anomalous transport has been shown to be an extremely important effect in understanding the resistivity and acceleration processes in the aurora [Pub.42; cit. 260] while his work on the lower hybrid turbulence [Pub. 37,49; it.165,174] has been critical in understanding and modeling reconnection and substorm physics. His papers in the area of anomalous transport and their applications have been cited over 1100 times.

Magnetospheric and Space Weather Modeling and Prediction:

In a competitive NASA procurement Prof. Papadopoulos was selected as the PI in charge of the Theory Investigation (> \$8M) of the International Solar Terrestrial Program (ISTP), an over \$2B multi-satellite mission (12 satellites), whose objective was to develop and test the first dynamic, self-consistent, quantitative, testable, global magnetospheric models, capable of cause and effect prediction. Under the direction of Prof. Papadopoulos the UMD/SPP group responded to the challenge by creating a sequence of data driven, dynamic models, from “Global MHD” to local hybrid that, using the satellite data as dynamic input, provided the first global 3D view of geospace, under dynamic substorm conditions with diagnostics capable of testing the models [Pub. 175]. The success of the dynamic models along the new visualization tools, led to the creation of the Center for Integrated Space Weather Modeling (CISM), an over \$10M NSF initiative, to transition the models to Space Weather. Furthermore the “Global MHD” computational models form the cornerstone of the theory/modeling effort of to “Leaving

With a Star” (LWS) the NASA multi-billion \$ initiative following ISTP. The NASA administrator recognized Prof. Papadopoulos’ technical leadership awarding him NASA’s Group Achievement Award. Within the context of predictive Space Weather modeling Prof. Papadopoulos was the first to recognize that the magnetosphere behaves as far from equilibrium dynamical system and thus its behavior can be predicted by analyzing time series of magnetic indices measured on the ground or space [Pub. 146,163; cit.143,96]. The SPP group pioneered these techniques that are widely used today for Space Weather prediction. It should be further noted that the five students trained under the UMD/ISTP program are currently among the leaders of Space Weather and LWS effort.

Laser-Plasma Interactions and their applications:

Prof. Papadopoulos along with Dr. Stamper are considered the discoverers of spontaneously created MGauss magnetic fields in laser produced plasmas [Publ. 9; Cit. 433]. The discovery was sparked from his theoretical analysis indicating that the observed in the laboratory anomalous plasma coupling could be explained only by the presence of such fields. He then proceeded to develop a theoretical understanding of the process and participate in the experimental demonstration of the effect (Phys. Rev. Let, 26, 2012, 1971). This discovery has serious implications in laser fusion as well as in overall applications of laser-plasma interactions including recent proton acceleration studies. Hundreds of papers have subsequently demonstrated the effect and his original paper and considered the major impact it played in laser fusion and other laser-plasma applications. During the 90s Prof. Papadopoulos developed a number of fast switching [Patent 3] and THz generation applications based on the interaction of laser with semiconductor plasmas and the remote generation of controlled broadband radiation sources by using dual femtosecond/nanosecond sources. [Pubs]. He is currently working on the development of novel, table-top, single dose Positron Emission Tomography [PET] radio-pharmaceutical generators based on laser proton accelerators as replacement of the currently used cyclotrons [Patent 8].

DENNIS PAPDOPOULOS – PUBLICATION LIST

I. REFEREED PUBLICATIONS, II BOOKS, III. PATENTS, IV. INVITED PRESENTATIONS

I. REFEREED JOURNAL PUBLICATIONS (265)

1. Enhanced Bremsstrahlung from Plasmas with Relativistic Electron Tails, K. Papadopoulos, Phys. Fluids, 12, 2185, 1969.
2. Comments on “Enhanced Bremmstrahlung from Supraluminous and Subluminous Waves in an Isotropic Homogeneous Plasma”, K. Papadopoulos and I. Lerche, Phys. Fluids, 12, 2461, 1969.

3. Collective Bremsstrahlung from Relativistic Electrons as a Possible Mechanism in Radio Sources, K. Papadopoulos and I. Lerche, *Ap. J.*, 158, 981, 1969.
4. Bremsstrahlung Radiation in Plasmas, K. Papadopoulos, *American Journal of Physics*, 38, 87, 1970.
5. Electron Heating by Electron-Ion Beam Instabilities, R.C. Davidson, N.A. Krall, K. Papadopoulos, and R. Shanny, *Phys. Rev. Lett.*, 24, 579, 1970.
6. Comments on "Collisionless Electrostatic Shock", J.M. Dawson, K. Papadopoulos, and R. Shanny, *Phys. Fluids*, 13, 1650, 1970.
7. Short Wavelength Turbulence within the Long mire Shell, K. Papadopoulos, *Proceedings D.N.A. Meeting, San Francisco*, vol. 5, p. 39-70, 1970.
8. Heating of Counterstreaming Ion Beams in an External Magnetic Field, K. Papadopoulos, R.C. Davidson, J.M. Dawson, I. Haber, D.A. Hammer, and R. Shanny, *Phys. Fluids*, 14, 849, 1971.
9. Spontaneous Magnetic Fields in Laser-Produced Plasmas, J.A. Stamper, K. Papadopoulos, R.N. Sudan, S.O. Dean, E.A. McLean, and J.M. Dawson, *Phys. Rev. Lett.*, 26, 2012, 1971.
10. Electromagnetic and Finite B_e Effects on the Counterstreaming Ion Instability, C. Wagner, K. Papadopoulos and I. Haber, *Phys. Lett.*, 35A, 440, 1971.
11. High Mach Number Magnetosonic Shocks, K. Papadopoulos, C. Wagner and I. Haber, *Phys. Rev. Lett.*, 27, 982, 1971.
12. Ion Thermalization in the Earth's Bow Shock, K. Papadopoulos, *Geophys. Res.*, 76, 3806, 1971.
13. Theory and Simulation of the Beam Cyclotron Instability, M. Lampe, W.M. Manheimer, J. McBride, J. Orens, K. Papadopoulos, R. Shanny, and E.N. Sudan, *Phys. Fluids*, 15, 662, 1972.
14. Notes on Plasma Physics "Proceedings of Advanced School of Physics", K. Papadopoulos, N.R.C. Democritus (Summer 1972), vol. III., Chap. 2, 1-72, N.R.C. Democritus Press, 1972.
15. Nonthermal Turbulent Heating in the Solar Envelope, K. Papadopoulos, *Ap.J.*, 179, 939, 1973.
16. Ion-Ion Instability Induced by a-c Electric Fields, K. Papadopoulos, *Ap.J.*, 179, 939, 1973.
17. Electrostatic Turbulence at Colliding Plasma Streams as the Source of Ion Heating in the Solar Wind, K. Papadopoulos, *Ap. J.*, 179, 931, 1973.
18. Laminar Interactions in Interstreaming Plasmas, R.C. Clark, J. Denavit and K. Papadopoulos, *Phys. Fl.*, 16, 1097, 1973.
19. Nonlinear Stabilization of Beam-plasma Interactions in Space, K. Papadopoulos and T. Coffey, *Proceedings of the Chapman Symposium, Boulder, Colorado*, 1973.
20. Nonthermal Features of the Auroral Plasma Due to Precipitating Electrons, K. Papadopoulos and T. Coffey, *Geophys. Res.*, 79, 674, 1974.
21. Stabilization of Electron Streams in Type III Solar Bursts, K. Papadopoulos, M. Goldstein, and R. Smith, *Ap. J.*, 190, 175, 1974.
22. Prospects on Thermonuclear Fusion, K. Papadopoulos, *Journal of Greek Technical Chamber*, 1/577, 543, 1974.
23. Anomalous Resistivity of the Auroral Plasma, K. Papadopoulos and T. Coffey, *Geophys. Res.*, 79, 1558, 1975.

24. Simulation of Colliding Solar Wind Streamers with Multifluid Codes, K. Papadopoulos, R.C. Clark and C.G. Wagner, Solar Wind Three, (ed. By C.T. Russel), UCLA, 343-350, 1974.
25. Topside Ionosphere Ion Heating Due to Electrostatic Ion Cyclotron Turbulence, P. Palmadesso, T. Coffey, S. Ossakow, and K. Papadopoulos, *J.G.R. Lett.*, 1, 105, 1974.
26. Parallel Propagation Effects on the Type I Electroject Instability, S. Ossakow, K. Papadopoulos, J. Orens and T. Coffey, *J.G.R.*, 80, 141, 1975.
27. Nonlinear Stabilization of Beam Plasma Interactions by Parametric Effects, K. Papadopoulos, *Phys. Fl.*, 18, 1769, 1975.
28. Theoretical Studies of Plasma Heating by Relativistic Electron Beams, at NRL, K. Papadopoulos, K.R. Chu, R.W. Clark, T. Coffey, R.C. Davidson, I. Haber, C. Kapetanakos, M. Lampe, R. Lee, P.C. Liewer, W. Manheimer, R. Shanny, P. Sprangle, C.D. Striffler, and C.E. Wagner, "Plasma Physics and Controlled Nuclear Fusion Research", I.A.E.A. Vienna, vol. III, 231, 1975.
29. Generation and Behavior of Large-Amplitude Ion-Acoustic Waves, N. Karatzas, A. Anastassiadis, and K. Papadopoulos, *Phys. Rev. Lett.*, 35, 33, 1975.
30. Tokamak Heating with Relativistic Electron Beams, D. Hammer and K. Papadopoulos, *Nucl. Fusion.*, 15, 997, 1975.
31. Interpretation of Soliton Formation and Parametric Instabilities, W. Manheimer and K. Papadopoulos, *Phys. Fl.*, 18, 1397, 1975.
32. Excitation of Lower Hybrid Waves in a Plasma by Electron Beam, K. Papadopoulos and P. Palmadesso, *The Physics of Fluids*, vol. 19, 4, 1976.
33. Generation of Terrestrial Kilometeric Radiation by a Beam-Driven Electromagnetic Instability, P. Palmadesso, T. Coffey, S. Ossakow, and K. Papadopoulos, *JGR*, 81, 1762, 1976.
34. Nonlinear Production of Superthermal Tails in Auroral Electrons, D. Matthews, M. Pongratz and K. Papadopoulos, *JGR*, 81, 123, 1976.
35. Transport Processes and Instabilities in Magnetically Confined Plasmas with $T_j = T$ Plasma Physics and Controlled Nuclear Fusion Research, B. Basu, B. Coppi, K. Molvig, F. Pegoraro, H. Haber, B. Hui, P. Palmadesso, K. Papadopoulos, and N. Winsor, Vienna, vol. II. 455, 1976.
36. Plasma Systems and their Dynamics, Stability, Simulation and Control, J.G. Siambis, K. Papadopoulos and P. Serafim, *Proceedings of the International Conference on Information Sciences and Systems*, University of Patras, Greece, August 19-24, 1976 (Hemisphere Publishing Corporation, Washington, DC), 1976.
37. Electrons of High Perpendicular Energy in the Low Density Regime of Tokamaks, M. Bornstici, F. Engelman, C.S. Liu, Y. Mok, and K. Papadopoulos, *Proceedings of Varena Conference*, September 1977.
38. The Lower-Hybrid Drift Instability as a Source of Anomalous Resistivity for Magnetic Field Line Reconnection, J.D. Hub, N.T. Gladd, and K. Papadopoulos, *JGR Lett.*, 4, 125, 1977.
39. Formation of a Positive Slope on Electron Runaway in Tokamaks, K. Papadopoulos, B. Bui and N. Winsor, *Nuclear Fusion*, 1975, 1087, 1997.
40. Simulations of Nonlinearly Stabilized Beam Plasma Interactions, H. Rowland and K. Papadopoulos, *Phys. Rev. Lett.*, 19, 1276, 1977.

41. Nonlinear Dynamics of Runaway Electrons and their Interactions with Tokamak Liners, C.S. Liu, Y.C. Mok, K. Papadopoulos, F. Engelmann, and M. Bornatici, *Phys. Rev. Lett.*, 39, 701, 1977.
42. A Review of Anomalous Resistivity for the Ionosphere, K. Papadopoulos, *Rev. of Geophys. And Space Physics*, 15, 113, 1977.
43. On the Theory of the Type III Burst Exciter, R.A. Smith, M.L. Goldstein, and K. Papadopoulos, *Solar Physics*, 1977.
44. Tail Formation in the Type II Solar Bursts, M. Lampe and K. Papadopoulos, *Ap.J.*, 212, 886, 1977.
45. Intense Relativistic Electron Beam Interaction with a Cool Theta Pinch Plasma, with D.A. Hammer, K.A. Gerber, W.F. Dove, C.G. Goldebaum, B.G. Logan, K. Papadopoulos, and A.W. Ali, *Phys. Fl.*, 21, 483, 1978.
46. Collisionless Effects on the Spectrum of Secondary Auroral Electrons at Low Altitudes, K. Papadopoulos and H. Rowland, *Geophys. Res.*, 83, 5768, 1978.
47. Nonlinear Stabilization of the Lower Hybrid Drift Instability by Electron Resonance Boardening, J. Huba and K. Papadopoulos, *Phys. Fl.*, 21, 121, 1978.
48. Solitons and $2\omega_e$ Radiation in Type III Bursts, K. Papadopoulos and H.P. Freund, *Ap. J. Lett.*, 10, 881, 1978.
49. Lower-Hybrid-Drift Wave Turbulence in the Distant Magnetotail, with J.D. Huba, N.T. Gladd, and K. Papadopoulos, *JGR*, 83, 5217, 1978.
50. Slope Reversal of Monotonically Decreasing Electron Tail in a Strong Magnetic Field, I. Haber, J.D. Huba, P. Palmadesso, and K. Papadopoulos, *Phys. Fl.*, 21, 1013, 1978.
51. A Theory of Solar Type III Radio Bursts, M.L. Goldstein, K. Papadopoulos and R.A. Smith, "Waves and Instabilities in Space Plasmas," ed. P. Palmadesso and K. Papadopoulos, p. 245, D. Reidel Co., Holland, 1979.
52. Comment on "Nonthermal Emission at the Plasma Frequency", K. Papadopoulos, H. Freund, and M. Lee, *Phys. Fl.*, 22, 386, 1979.
53. On the Physics of Strong Turbulence for Plasma Waves, K. Papadopoulos, *Diagnostics for Fusion Experiments*, (eds. E. Sindoni and C. Wharton), Pergamon Press, 1979.
54. The Role of Microturbulence in Collisionless Reconnection, K. Papadopoulos, "Dynamics of the Magnetosphere", 289, (es. S.I. Akasufu), D. Reidel Co., 1979.
55. Collective Radio-emission from Plasma, K. Papadopoulos and H.P. Freund, *Space Sci. Review*, 24, 511, 1979.
56. Nonlinear Stability of Solar Type II Radio Bursts Theory, R.A. Smith, M.L. Goldstein, and K. Papadopoulos, *Ap. J.*, 234, 348, 1979.
57. Scaling Laws for the Strongly Turbulent Electron Beam Plasma Interactions, K. Papadopoulos and H. Freund, *Comm. Plasma Physics*, 5, 113, 1979.
58. On the Impossibility of Upconversion of Ion Sound to Langmuir Waves, L. Vlahos and K. Papadopoulos, *Ap. J. Lett.*, 234, 1217, 1979.
59. Nonlinear Stability of Solar Type III Radio Bursts: Comparison with Observations, M. Goldstein, R.A. Smith, and K. Papadopoulos, *Ap. J.*, 234, 683, 1979.
60. Interplanetary Type III Radio Bursts, K. Papadopoulos, *Rev. of Geophys. And Sp. Physics*, 17, 624, 1979.
61. Collective Plasma Effects Associated with the Continuous Injection Model

- of Solar Flare Particle Streams, L. Vlahos and K. Papadopoulos, *Ap. J.*, 233, 717, 1979.
62. The Oscillating Two Stream and Parametric Decay Instabilities in a Weakly Magnetized Plasma, H. Freund and K. Papadopoulos, *Phys. Fl.*, 23, 139, 1980.
 63. Spontaneous Emission of Radiation from a Localized Langmuir Perturbation, H. Freund and K. Papadopoulos, *Phys. Fl.*, 732, 1980.
 64. Strongly Turbulent Stabilization of Electron Beam-Plasma Interactions, H. Freund, H. Haber, P. Palmadesso and K. Papadopoulos, *Phys. Fl.*, 23, 518, 1980.
 65. A Nonlinear Coherent Theory of Auroral Kilometric Radiation, C. Grabbe, K. Papadopoulos and P. Palmadesso, *J. Geophys. Res.*, 85, 3337, 1980.
 66. Radiation from a Localized Langmuir Oscillation in a Uniformly Magnetized Plasma, H. Freund and K. Papadopoulos, *Phys. Fl.*, 23, 1546, 1980.
 67. Current Understanding of the Type III Solar Radio Bursts, K. Papadopoulos, "Radio Physics of the Sun", 287, (eds. M. Kundu and T. Gergely), Reidel Co., 1980.
 68. Nonlinear Excitation of Ion Cyclotron Waves by Plasma Waves, K. Papadopoulos, J. Huba, and P. Chaturvedi, *Phys. Fl.*, 23, 1479, 1980.
 69. Stochastic Acceleration of Large M/Q Ions by Hydrogen Cyclotron Waves in the Magnetosphere, K. Papadopoulos, J. Gaffey, and P. Palmadesso, *Geophys. Res. Lett.*, 7, 1014, 1980.
 70. Amplification of Ion Cyclotron Wave via High Frequency Electron Plasma Wave Turbulence, J.D. Huba, P.K. Chaturvedi, and K. Papadopoulos, *Phys. Fluids*, 23, 1479, 1980.
 71. The Heating of Gas in Clusters of Galaxies by Relativistic Electrons: Collective Effects, J.S. Scott, G.D. Holman, J.A. Ionson, and K. Papadopoulos, *Phys. Fluids*, 23, 1479, 1980.
 72. Simulation of a Perpendicular Bow Shock, M.M. Leroy, C.C. Goodrich, D. Winske, C.S. Wu, and K. Papadopoulos, *Geophys. Res. Lett.*, 8, 1269, 1981.
 73. Scaling of the Beam-Plasma Discharge, H.L. Rowland, C.L. Chang, and K. Papadopoulos, *J. Geophys. Res.*, 86, 9215, 1981.
 74. Modulation Instability in a Plasma with Suprathermal Electrons, H. Freund, P. Smith, K. Papadopoulos, and P. Palmadesso, *Phys. Fl.*, 24, 442, 1981.
 75. Strong Langmuir Turbulence in One and Two Dimensions, H. Rowland, J. Lyons and K. Papadopoulos, *Phys. Rev. Lett.*, 46, 346, 1981.
 76. One Dimensional Direct Current Resistivity Due to Strong Turbulence, H. Rowland, P. Palmadesso and K. Papadopoulos, *Phys. Fl.*, 24, 832, 1981.
 77. Anomalous Resistivity on Auroral Field Lines, H. Rowland, P.L. Palmadesso, and K. Papadopoulos, *Geophys. Res. Lett.*, vol. 8, no. 12, 1257-1260, 1981.
 78. Wireless Generation of ELF/VLF Radiation in the Ionosphere, C.L. Chang, V. Tripathi, K. Papadopoulos, J. Fedder, P.J. Palmadesso, and S.L. Ossakow, *The Effect Ionosphere on Radio Systems*, p. 91, (ed. J.M. Goodman), 1981).
 79. Theory of the Beam Plasma Discharge, K. Papadopoulos, (*Artificial Particle Beams in Space Plasma Studies*), p. 505, Pergamon Press, (ed. B. Grandal), 1981.
 80. Plasma Lasers, K. Papadopoulos, *Proceedings of 1st International School of Plasma Astrophysics, Varenna*, p. 161, ESASP-161, 1982.
 81. Limitations on the Upconversion of Ion-sound to Langmuir Turbulence, L. Vlahos and K. Papadopoulos, *Ap. J. Lett.*, vol. 252, no. 2, part 2, 1982.

82. Comments on “High Mach Number Magnetosonic Shocks”, K. Papadopoulos, Proceedings of 1st International School of Plasma Astrophysics, Varenna, 1, ESASP-161, 1982.
83. Electron Acceleration in Magnetosonic Shock Fronts, K. Papadopoulos, Proceedings of 1st International School of Plasma Astrophysics, Varenna, 89, ESA-SP-161, 1982.
84. Parametric Excitation of Alfvén Waves in the Ionosphere, K. Papadopoulos, R.R. Sharma, and V.K. Tripathi, J. Geophys. Res., 87, 1491, 1982.
85. Electron Acceleration and Radiation Signatures in Loop Coronal Transients, L. Vlahos, T.E. Gergely, and K. Papadopoulos, Ap. J., 258, no. 2, 812-822, 1982.
86. Threshold Criterion for a Space Simulation Beam-Plasma Discharge, E.P. Szuszcwicz, D.N. Walker, K. Papadopoulos, W. Bernstein, and C.S. Lin, J. Geophys. Res., vol. 87, no. A3, 1565-1573, 1981.
87. Excitation of the Earth-Ionosphere Waveguide by an ELF Source in Ionosphere, V. Tripathi, C.L. Chang, and K. Papadopoulos, Radio Science, vol. 17, number 5, 1321-1326, 1982.
88. Parametric Excitation of Eigenmodes in Inhomogeneous Media, V.K. Tripathi and K. Papadopoulos, Comments in Plasma Physics, vol. 7, no. 4, 123-130, 1982.
89. The Structure of Perpendicular Bow Shocks, M.M. Leroy, D. Winske, C.C. Goodrich, C.S. Wu, and K. Papadopoulos, J. Geophys. Res., 87, 5081, 1982.
90. Generation of Electron Plasma Waves in the Upstream Solar Wind, S.F. Fung, K. Papadopoulos, and C.S. Wu, J. Geophys. Res., vol. 87, no. A10, 8077-8080, 1982.
91. The Importance of Plasma Effects on Electron-Cyclotron Maser Emission from Flaring Loops, R.R. Sharma, L. Vlahos, and K. Papadopoulos, Astronomy and Astrophysics, 112, 377-385, 1982.
92. Electron Pitch Angle Scattering and the Impulsive Phase Microwave and Hard X-ray Emission from Solar Flares, G. Holman, M.R. Kundu, and K. Papadopoulos, The Astro. J., 257, 354, 1982.
93. Reply, S.F. Fung, C.S. Wu, and K. Papadopoulos, J. Geophys. Res., 88, 7255, 1983 in regard to “Generation of Electron Plasma Waves in the Upstream Solar Wind” with S.F. Fung and K. Papadopoulos, J. of Geophysical Res., 87, 8077-8080, 1982.
94. Stochastic Three-Wave Interaction in Flaring Solar Loops, L. Vlahos, R. Sharma, and K. Papadopoulos, Astrophysical Journal, 275, no. 1, 1983.
95. Creation of High Energy Electron Tails by Means to the Modified Two-Stream, M. Tanaka and K. Papadopoulos, Phys. Fluids, 26, 1697, 1983.
96. A Source of the Backstreaming Ion Beams in the Foreshock Region, M. Tanaka, C. Goodrich, D. Winske, and K. Papadopoulos, J. Geophys. Res., 88, 3046, 1983.
97. Selective Non-Resonant Acceleration of $^3\text{H}_e^{++}$ and Heavy Ions by H^+ Cyclotron Waves, H. Varvoglis and K. Papadopoulos, Ap. J. Lett., L95, 270, 1983.
98. Efficient Parametric Downconversion in Dissipative Media, K. Papadopoulos, K. Ko, and U. Tripathi, Physical Review Letters, 51, 6, 1983.
99. The Space Shuttle Environment as Evidence of Critical Ionization Phenomenon, K. Papadopoulos, ESA SP-195, 227-244m 1983.
100. A Theory of Jovian Decameter Radiation, M.L. Goldstein, R.R. Sharma, M. Ben-Ari, A. Eviatar, and K. Papadopoulos, J. Geophys. Res., 88, A2, 792-802, 1983.

101. Plasma Eigenmodes and Particle Acceleration, H.L. Rowland, K. Papadopoulos, and M. Tanaka, *Comments Plasma Phys.*, 8, 77-84, 1983.
102. A Kinetic Lower Hybrid Cross-Field Streaming Instability, C.S. Wu, Y.M. Zhou, S.T. Tsai, S.C. Guo, D. Winske, and K. Papadopoulos, *Phys. Fluids*, 26, 1259, 1983.
103. Suprathermal Electron Tail Distribution in Space Simulation Beam Plasma Discharge, Active Experiments in Space at Alpbach, ESA SP-195, 189-192, 1983.
104. Review of Ionospheric VLF and ELF Generation, K. Papadopoulos, K. Ko, A. Reiman, and V. Tripathi, ESA SP-195, 11-29, 1983.
105. Neutral Gas Plasma Interactions and Critical Ionization Velocity Phenomena, K. Papadopoulos, Proceedings of Twenty-fifth Annual Meeting of the Division of Plasma Physics, Los Angeles, California, 1983.
106. Microinstabilities Associated with a High Mach Number Perpendicular Bow Shock, C.S. Wu, D. Winske, Y.M. Zhou, S.T. Tsai, P. Rodriguez, M. Tanaka, K. Papadopoulos, K. Akimoto, C.S. Liu, M.M. Leroy, and C.C. Goodrich, *Space Sci. Rev.*, 37, 63, 1984.
107. On the Plasma Physics of the Beam Plasma Discharge, K. Papadopoulos, *Comments Plasma Phys. Controlled Fusion*, 9, 11-21, 1984.
108. Large Scale Chaotic Motion of Charged Particles in a Magnetic Field and a Longitudinal Electrostatic Waves, H. Varvoglis and K. Papadopoulos, *J. Phys. A: Math Gen.*, 17, 311-321, 1984.
109. Measurement and Theoretical of the Spatial Distribution of Excitation by High-Current Electron Beams Injected into the Ionosphere, I.L. Kofsky, D.P. Villanucci, R.B. Sluder, M.T. Chamberlain, C.L. Change, K. Ko, and K. Papadopoulos, *Geophys. Res. Lett.*, 11, 1011-1014, 1984.
110. On the Shuttle Glow (The Plasma Alternative), K. Papadopoulos, *Radio Science*, 19, 571-577, 1984.
111. Generation of ELF/ULF Waves in the Ionosphere by Dynamo Processes, K. Papadopoulos and C.L. Chang, 12, 279, 1985.
112. Early Time Interaction of Lithium Ions with the Solar Wind in the AMPTE Mission, K. Papadopoulos, A.T.Y. Lui, C. Goodrich, and A. Mankofsky, *JGR*, 91, A2, 1333-1338, 1986.
113. Microinstabilities and Anomalous Transport in Collisionless Shocks, K. Papadopoulos, AGU Geophysical Monograph 34, (eds, R.G. Stone and B.T. Tsurutani), 59-90, 1985.
114. Perspectives on Space and Astrophysical Plasma Physics, C.F. Kennel, J. Arons, R. Blandford, F. Coroniti, M. Israel, L. Lanzerotti, A. Lightman, K. Papadopoulos, R. Rosner, and F. Scarf, *Unstable Current Systems and Plasma Instabilities in Astrophysics*, 537-552, (eds. M.R. Kundu and G.D. Holman), 1985.
115. Spacecraft Induced Plasma Energization and its Role in Glow Phenomena, K. Papadopoulos and R.A. Smith, Second Workshop on Spacecraft Glow, 1119, NASA Conf. Proc. 2391, (eds. J.H. Wait, Jr. and T. Moorehead), 1985.
116. Stochastic Ion Acceleration by Coherent Electrostatic Wave, H. Varvoglis and K. Papadopoulos, *J. Geophys.*, 56, 201-210, 1985.
117. Runaway Tails in Magnetized Plasmas, E. Moghaddam-Taaheri, L. Vlahos, H.L. Rowland and K. Papadopoulos, *Phys. Fluids*, 28, 11, 1985.

118. Microinstabilities and Anomalous Transport in Collisionless Shocks, K. Papadopoulos, *Advances in Space Plasma Physics*, p. 289, (ed. B. Buti), Warner Scientific Press, 1985.
119. On the Physics of the Critical Ionization Velocity Phenomena, K. Papadopoulos, in *Advances in Space Plasma Physics*, p. 33, (ed. B. Buti), Warner Scientific Press, 1985.
120. Lower-Hybrid Instabilities Driven by an Ion Velocity Ring, K. Akimoto, K. Papadopoulos, and D. Winske, *J. Plasma Physics*, 34, part 3, 445-465, 1985.
121. The Interaction of Two Perpendicular Collisionless Shocks, P.J. Cargill, C.C. Goodrich, and K. Papadopoulos, *Phys. Rev. Lett.*, 56, 1988, 1986.
122. Ion Acoustic Instabilities Driven by an Ion Velocity Ring, K. Akimoto, K. Papadopoulos, and D. Winske, *J. Plasma Physics*, H36516 PLA, 1-13, 1986.
123. ELF Generation of the Lower Ionosphere via Collisional Parametric Decay, K. Ko, C.R. Menyuk, A. Reiman, V. Tripathi, P. Palmadesso and K. Papadopoulos, *J. Geophys. Res.*, 91, 10,097-10,107, 1986.
124. Scaling of the Beam Plasma Discharge for Low Magnetic Fields, K. Papadopoulos, *J. Geophys. Res.*, 91, 1627, 1986.
125. On the Initial Motion of Artificial Comets in the AMPTE Release, K. Papadopoulos and A.T.Y. Lui, *Geophys. Res. Lett.*, 13, 925, 1986.
126. Active Nonlinear Ultralow Frequency Generation in the Ionosphere, S. Ganguli, W. Gordon, and K. Papadopoulos, *Physical Rev. Lett.*, 57, 641-644, 1986.
127. The Emission of Narrow-Band Jovian Kilometric Radiation, S.F. Fung and K. Papadopoulos, *J. Geophys. Res.*, 92, 8579-8593, 1987.
128. Stochastic Acceleration Using Electron Cyclotron Frequency Waves, C. Menyuk, K. Papadopoulos, and A. Drobot, *Phys. Rev. Lett.*, 58, 20, 2071-2074, 1987.
129. Collisionless Coupling in the AMP TE Artificial Comet, K. Papadopoulos, J.D. Huba and A.T.Y. Lui, *J. Geophys. Res.*, 92, 47, 1987.
130. The Onset of Alfvénic Turbulence, S. Ghosh and K. Papadopoulos, *Phys. of Fluids*, 30, 1371, 1987.
131. On the Turbulent Heating and the Threshold Condition in the Critical Ionization Velocity Interaction, E. Mobius, K. Papadopoulos, and A. Piel, *Planet Space Sci.*, 35, 345, 1987.
132. Electron Heating in Superhigh Mach Number Shocks, K. Papadopoulos, *Astrophysics and Space Science*, 144, 535-547, 1988.
133. Current Understanding and Issues on Electron Beam Injection in Space, E.P. Szuszczewicz and K. Papadopoulos, *Adv. in Space Res.*, 8, 1, 101-11-, 1988.
134. Long Range Cross Field Ion Beam Propagation in the Diamagnetic Region, K. Papadopoulos, A. Mankofsky, and A. Drobot, *Phys. Rev. Lett.*, 61, 1, 94-97, 1988.
135. A Mechanism for Strong Electron Heating in Supernova Remnants, P.J. Cargill and K. Papadopoulos, *Astroph. J. Letters*, 329, L29-L32, 1988.
136. On the Physics of Collisionless High Mach Number Shocks, K. Papadopoulos, *Hungarian Academy of Sciences, Proceedings of the International Conference on Collisionless Shocks*, (ed. K. Szego), 123-158, 1988.
137. Electron Acceleration using Intense Electromagnetic Waves, C.R. Menyuk, A.T. Drobot, K. Papadopoulos, and H. Karimabadi, *Phys. of Fluids*, 31, 3768, 1988.

138. Lower Hybrid Waves Upstream of Comets and their Implications for the Comet Halley “Bow Shock”, K. Hizanidis, P.J. Cargill and K. Papadopoulos, *J. Geophys. Res.*, 93, 9, 1988.
139. Quasineutral Beam Propagation in Space, K. Papadopoulos, A. Mankofsky, and A. Drobot, *Proceedings of Sandai Conf.*, American Geophysical Union 149-160, 1988.
140. Resonance Absorption of Alfvén Waves at Comet-Solar Wind Interaction Regions, A.S. Sharma, P.J. Cargill, and K. Papadopoulos, *Geophys. Res. Lett.*, 15, 8, 740-743, 1988.
141. Electromagnetic Radiation from Strong Langmuir Turbulence, K. Akimoto, H.L. Rowland, and K. Papadopoulos, *Phys. Fluids*, 31, 8, 1988.
142. On the Efficient Operation of a Plasma ELF Antenna Driven by Modulation of Ionospheric Currents, K. Papadopoulos, A.S. Sharma, and C.L. Chang, *Comments Plasma Phys. Controlled Fusion*, 13(1), 1-17, 1989.
143. A Current Disruption Mechanism in the Neutral Sheet for Triggering Substorms, A.T.Y. Liu, A. Mankofsky, C.L. Chang, K. Papadopoulos, and C.S. Wu, *Geophys. Res. Lett.*, 17, 6, 745-748, 1990.
144. Electrojet Modulation ELF Communications, K. Papadopoulos, R.A. Shanny, L. Susman, M. Machina, and P. Stamboulis, *AGARD Conference Proceedings No. 485*, (eds. J.E. Rasmussen, P.A. Kossey and T.B. Jones), 37A-1 – 37A-9, 1990.
145. Physics of RF Breakdown for AIM Applications, K. Papadopoulos, T. Wallace, P. Vitello, R. Shanny, K. Tsang and P. Lallement, *AGARD Conference Proceedings No. 485*, (eds. J.E. Rasmussen, P.A. Kossey and T.B. Jones), 17B-1 – 17B-13, 1990.
146. Low-Dimensional Chaos in Magnetospheric Activity from AE Time Series, D.V. Vassiliadis, A.S. Sharma, T.E. Eastman, and K. Papadopoulos, *Geophys. Res. Lett.*, 17, 11, 1841-1844, 1990.
147. Recent Developments in Ionospheric Modifications by Radio Waves, K. Papadopoulos, *AIP, Research Trends in Physics*, (ed. V. Stefan, LaJolla International School of Physics), 545-585, 1990.
148. On the Efficiency of Ionospheric ELF Generation, K. Papadopoulos, C.L. Chang, P. Vitello, and A. Drobot, *Radio Science*, 25(b), 1311-1320, 1990.
149. Lyapunov Exponent of Magnetospheric Activity from AL Times Series, D. Vassiliadis, A.S. Sharma and K. Papadopoulos, *Geophys. Res. Lett.*, 18, 8, 1643-1646, 1991.
150. Ballistic Cross Field Ion Beam Propagation in a Magnetoplasma, K. Papadopoulos, A. Mankofsky, R.C. Davidson, and A.T. Drobot, *Physics of Fluids*, B, 3, 1075, 1991.
151. RF Ionization of the Lower Ionosphere, K. Tsang, A. Drobot and K. Papadopoulos, P. Vitello, T. Wallace, and R. Shanny, *Radio Science*, 20, 1345, 1991.
152. Current Collection and Current Closure in the Tethered Satellite System, A. Drobot, P. Satyanarayana, C.-L. Chang, K. Tsang, and K. Papadopoulos, *AIAA 22nd Fluid Dynamics, Plasma Dynamics & Lasers Conference*, 1991.
153. Critical Ionization Velocity in Space, K. Papadopoulos, *AIAA-92-0788*, 1992.
154. The CIV Processes in the CRIT Experiments, K. Papadopoulos, *Geophys. Res. Lett.*, 19(6), 605-608, 1992.
155. The Flight of the Tethered Satellite System, K. Papadopoulos, A.T. Drobot, and N. Stone, *EOS Transactions, AGU*, 73, 30, 321-323, 1992.

156. Time Series Analysis of Magnetospheric Activity using Nonlinear Dynamical Methods, D. Vassiliadis, A.S. Sharma, and K. Papadopoulos, in *Chaotic Dynamics: Theory and Practice* (ed. T. Bountis), Plenum Press, 1993.
157. Ionization Rates for Atmospheric and Ionospheric Breakdown, K. Papadopoulos, G. Milikh, A. Gurevich, A. Drobot, and R. Shanny, *Ionization Rates for Atmospheric and Ionospheric Breakdown*, *J. Geophys. Res.*, 98 (A10), 17,593-17,596, 1993.
158. Lidar Probing of the D- and E Regions of the Ionosphere, K. Papadopoulos, G. Milikh, and A. Zigler, *Radio Science*, 1993.
159. Triggering the HF Breakdown of the atmosphere by Barium Release, K. Papadopoulos, G.M. Milikh, and P. Sprangle, *Geophys. Res. Lett.*, 20, 6, 471-474, 1993.
160. Lower Hybrid Turbulence at Cometary Bow Wave and Acceleration of Cometary Protons, V.D. Shapiro, V.I. Shevchenko, A.S. Sharma, and K. Papadopoulos, *J. Geophys. Res.*, 98, A2, 1325-1331, 1993.
161. An Empirical Model Relating the Auroral Geomagnetic Activity to the Interplanetary Magnetic Field, D. Vassiliadis, A.S. Sharma, and K. Papadopoulos, *Geophys. Res. Lett.*, 20(16), 1731-1734, 1993.
162. Electromagnetic Wave Reflection from Irregular Plasma Layers, K. Papadopoulos, R. Short, and R. Shanny, presented at an AGARD Meeting, 1993.
163. Reconstruction of Low Dimensional Magnetospheric Dynamics by Singular Spectrum Analysis, A.S. Sharma, D. Vassiliadis, and K. Papadopoulos, *Geophys. Res. Lett.*, 20, 335-338, 1993.
164. Is the Magnetosphere a Lens for MHD Waves?, K. Papadopoulos, A.S. Sharma, and J.A. Valdivia, *Geophys. Res. Lett.*, 20(24), 2809-2812, 1993.
165. Cerenkov Excitation of Whistler/Helicon Waves by Ionospheric HF Heating, K. Papadopoulos, C.L. Chang, and H.B. Zhou, *J. Geophys. Res. Lett.*, 21, 1767-1770, 1994.
166. Remote Photometry of the Atmosphere Using Microwave Breakdown, K. Papadopoulos, G.M. Milikh, A.W. Ali, and R. Shanny, *J. Geophys. Res.*, 99 (D5), 10,387-10,394, 1994.
167. The Role of Helicon Waves in Magnetospheric and Ionospheric Physics, K. Papadopoulos, H.B. Zhou, and A.S. Sharma, *Comm. in Plasma Physics & Cont. Fusion*, 15, 6, 321-337, 1994.
168. Hybrid Simulations of Whistler Wave Generation and Current Closure by a Pulsed Tether in the Ionosphere, C.L. Chang, A.S. Lipatov, A.T. Drobot, K. Papadopoulos, and P. Satya-Narayana, *Geophys. Res. Lett.*, 21(11), 1015-1018, 1994.
169. The Modulational Instability of Lower Hybrid Waves at the Magnetopause, V.D. Shapiro, V.I. Shevchenko, P.J. Cargill, and K. Papadopoulos, *JGR*, 99(A12), 23,735-23,740, 1994.
170. Low Dimensional Dynamics and Prediction of Substorms, A.S. Sharma, J.A. Valdivia and K. Papadopoulos, *Proceedings of the Second International Conference on Substorms*, Fairbanks, Alaska, Geophysical Institute, 1994.
171. Dark Current Reduction in High Power Photoconducting Semiconductor Switches, D. Hashimshony, C. Cohen, A. Zigler, and K. Papadopoulos, *Optics Letters*, 1995.
172. On the Physics of High Altitude Lightning, G.M. Milikh, K. Papadopoulos, and C.L. Chang, *Geophys. Res. Lett.*, 22(2), 85-88, 1995.

173. Alpha Particle Heating at Comet-Solar Wind Interactions Regions, A.S. Sharma and K. Papadopoulos, *J. Geophys. Res.*, 100, A5, 7891-7897, 1995.
174. Magnetically Insulated Photoconducting Semiconductor Switches, K. Papadopoulos, A. Zigler, D. Book, and R. Shanny, *Comments on Plasma Phys. Controlled Fusion*, 16, 4, 221-230, 1995.
175. Global and Local Geospace Modeling in ISTP, K. Papadopoulos, J.G. Lyon, C.C. Goodrich, P.J. Cargill, A.S. Sharma, R. Kulkarni, C.L. Chang, and A. Mankofsky, *Space Science Reviews*, 71, 671-690, 1995.
176. The Flow of Electromagnetic Energy and Momentum During the Growth Phase of a Magnetosphere Substorm, C.C. Goodrich, K. Papadopoulos, M. Wiltberger, and J. Lyon, *Geoph. Res. Lett.*, submitted 1995.
177. Collisionless Breakdown of Magnetic Insulation in Plasmas, K. Papadopoulos, D. Book, and A. Zigler, *Physical Review Letters*, 76(17), 3120-3123, 1996.
178. Prediction of Magnetic Storms by Nonlinear Dynamical Models, J.A. Valdivia, A.S. Sharma, and K. Papadopoulos, *Geophys. Res. Lett.*, 23(21), 2899-2901, 1996.
179. Breakdown Magnetized Semiconductor Plasma to a Laser Pulse, K. Papadopoulos, A. Zigler, D.L. Book, C. Cohen and D. Hashimshony, *IEEE Transaction of Plasma Science*, 24(3), 1095-1100, 1996.
180. Electromagnetohydrodynamic Response of a Plasma to an External Current Pulse, H.B. Zhou, K. Papadopoulos, and A.S. Sharma, *Phys. of Plasma*, 3(5), 1484-1494, 1996.
181. Comment on "Can Gamma Radiation be Produced in the Electrical Environment above Thunderstorms", K. Papadopoulos, G. Milikh, and J. Valdivia, *GRL*, 23(17), 2283-2284, 1996.
182. The Self-Focusing Instability in the Presence of Density Irregularities in the Ionosphere, P.N. Guzdar, P.K. Chaturvedi, K. Papadopoulos, M.J. Keskinen, and S.L. Ossakow, *JGR*, 101, A2, 2453-2460, 1996.
183. Direct Cerenkov Excitation of Waveguide Modes by a Mobile Ionospheric Heater, N. Borisov, A. Gurevich, and K. Papadopoulos, *Radio Science*, 33(4), 859-867, 1996.
184. Runaway Electrons in the Atmosphere in the Presence of Magnetic Field, A.V. Gurevich, J.A. Valdivia, G.M. Milikh, and K. Papadopoulos, *Radio Science*, 31(6), 1541-1554, 1996.
185. Comment on "High Altitude Discharges and Gamma-Ray Flashes: A Manifestation of Runaway Breakdown" by Yuri Taranenko and Robert Roussel-Dupre, K. Papadopoulos, and J. Valdivia, *Geophys. Res. Lett.*, 24(21), 2643-2644, 1997.
186. Models of Red Sprite Optical Spectra, G.M. Milikh, J.A. Valdivia, and K. Papadopoulos, *Geophys. Res. Lett.*, 24, 833-836, 1997.
187. Red Sprites: Lightning as a Fractal Antenna, J.A. Valdivia, G. Milikh, and K. Papadopoulos, *GRL*, 24(24), 3169-3172, 1997.
188. Current-Voltage Characteristics of the Tethered Satellite System Measurements and Uncertainties, C.L. Chang, A.T. Drobot, K. Papadopoulos, K. Wright, N. Stone, C. Gurgiolo, D. Winningham, and C. Bonifazi, *GRL*, 25, 715, 1998.
189. Ion Reflection by the TSS-1R Satellite, K. Papadopoulos, C.L. Chang, and A. Drobot, *GRL*, 25, 745, 1998.
190. Simulation of the March 9, 1995 Substorm: Auroral Brightening and the Onset

- of Lobe Reconnection, J.L. Lyon, R.E. Lopez, C.C. Goodrich, M. Wiltberger, and K. Papadopoulos, *GRL*, 25(15), 3039-3042, 1998.
191. An Overview of the Impact of the January 10-11, 1997 Magnetic Cloud on the Magnetosphere via Global MHD Simulation, C.C. Goodrich, M. Wiltberger, R.E. Lopez, and K. Papadopoulos, *GRL*, 15(14), 2537-2540, 1998.
 192. Coupling Between Local and Activity During the Substorm Expansion Phase: Results from MHD Simulations and Comparison to Observations, R. Lopez, C. Goodrich, M. Wiltberger, K. Papadopoulos, and J. Lyon, in *Proc. International Conference on Substorms-4*, edited by S. Kokubun and Y. Kamide, 169-174, 1998.
 193. Spectrum of Red Sprites, G. Milikh, J.A. Valdivia, and K. Papadopoulos, *JAPP*, 60, 907-915, 1998.
 194. Simulation of the March 9, 1995 Substorm and Initial Comparison to Data, R.E. Lopez, C.C. Goodrich, M. Wiltberger, and K. Papadopoulos, *AGU, Geophysical Monograph* 104, 237-245, 1998.
 195. Substorm Onset and Evolution: Coupling Between Tail Regions in MHD Simulations, R. Lopez, C. Goodrich, M. Wiltberger, K. Papadopoulos, and J.L. Lyon, *Physics of Space Plasmas*, 1998.
 196. The Thermal Self-Focusing Instability near the Critical Surface in the High-Latitude Ionosphere, P.N. Guzdar, P.K. Chaturvedi, K. Papadopoulos, M.J. Keskinen, and S.L. Ossakow, *JGR*, 103(A2), 2231-2237, 1998.
 197. Global MHD Simulation of Actual Magnetospheric Substorm Events, C.C. Goodrich, M. Wiltberger, R.E. Lopez, K. Papadopoulos, and J.G. Lyon, in *Proc. International Conference on Substorms*, (ed. By S. Kokubun), 645-649, 1999.
 198. Generation of Tunable FIR Radiation by the Interaction of a Superluminous Ionizing Front with an Electrically Based Photoconductor, D. Hashimshony, C. Cohen, A. Zigler, and K. Papadopoulos, *Applied Phys. Letters*, 74, 12, 1669-1671, 1999.
 199. Effects of Northward Turnings on the Initiation of Substorms in Global MHD Simulations, M. Wiltberger, K. Papadopoulos, R.E. Lopez, C.C. Goodrich, and J.G. Lyon, in *Proc. International Conference on Substorms*, edited by S. Kokubun, 187-290, 1999.
 200. MHD Simulations of the Response of High-Latitude Potential Patterns and Polar Cap Boundaries to Sudden Southward Turnings of the Interplanetary Magnetic Field, R.E. Lopez, M. Wiltberger, J.C. Lyon, C.C. Goodrich, and K. Papadopoulos, *GRL*, 967-970, 25, 1999.
 201. The Physics of Substorms as Revealed by the ISTP, K. Papadopoulos, C.C. Goodrich, M. Wiltberger, R.E. Lopez, and J.G. Lyon, *Physics and Chemistry of the Earth*, 24, 1-3, 189-202, 1999.
 202. Fractal Antenna Elements and Arrays, X. Yang, J. Chiocetti, D. Papadopoulos, and L. Sussman, *Applied Microwave and Wireless*, 1999.
 203. Evidence for Langmuir Envelope Solitons in Solar Type III Bursts Source Regions, G. Thejappa, M.L. Goldstein, R.J. MacDowall, K. Papadopoulos, and R.G. Stone, *J. of Geophys. Res.*, 104, A12, 28,279-28,293, 1999.
 204. The spatio-temporal structure of magnetic storms, J.A. Valdivia, D. Vassiliadis, A.J. Klimas, A.S. Sharma, and K. Papadopoulos, *J. Geophys. Res.*, 104, 12,239, 1999.
 205. Spatio-temporal development of filaments due to the thermal self-focusing instability near the critical surface in ionospheric plasmas, N.A. Gondarenko, P.N. Guzdar, G.M.

- Milikh, A.S. Sharma, K. Papadopoulos, and S.L. Ossakow, *Radio Sci. Quantum Electron*, 42, 670, 1999.
206. ELF emission generated by the HAARP HF-heater using varying frequency and polarization, G.M. Milikh, K. Papadopoulos, M. McCarrick, and J. Preston, *Radiophysics and Quantum Electrons*, 42, 639-646, 1999.
 207. Generation of sub-millimeter radiation from a static field by a superluminous ionization front in semiconductor plasma, D. Hashimshony, A. Sigler, and K. Papadopoulos, *Appl. Phys. Lett.*, 75, 892, 1999.
 208. Generation of tunable, bandwidth controllable terahertz radiation”, THz and GHz, D. Hashimshony, A. Zigler, and K. Papadopoulos, *Photonics*. Edt. R.J. Hwu and K. Wu, *Proc. SPIE*, 3795, 477, 1999.
 209. Miniature photoconducting capacitor array as a source for tunable THz radiation, D. Hashimshony, A. Zigler, and K. Papadopoulos, *Rev. of Scientific Instruments*, 71, 2380, 2000.
 210. Diffraction Model of Ionospheric Irregularity-Induced Heater-Wave Pattern Detected on the WIND Satellite. N.A. Gondarenko, K. Papadopoulos, G. Milikh, A.S. Sharma, P. Rodriguez, Yu V. Tokarev, Yu. I. Belov, and S.L. Ossakow, *Geophys. Res. Letts.*, 27, 3, 317-320, 2000.
 211. Global and Multi-Scale Features of Substorms Inferred from Ground-Based and Multi-Spacecraft Data, A.S. Sharma, V.A. Sergeev, M.I. Sitnov and K. Papadopoulos, *Proc. 5th International Conference on Substorms*, St. Petersburg, Russia 16-20 2000 (ESA SP-443) July 2000.
 212. Substorms as nonequilibrium transitions of the magnetosphere, A.S. Sharma, M.I. Sitnov and K. Papadopoulos, *J. Atmos. Solar Terr. Phys.*, 63, 1399-1406, 2001.
 213. Modeling ionospheric absorption modified by anomalous heating during substorms, G.M. Milikh, Y.S. Dimant, X. Shao, P.N. Guzdar, A.S. Sharma, K. Papadopoulos, E.M. Burns, C.C. Goodrich, T.J. Rosenberg, A.T. Weatherwax, M.J. Wiltberger, J.G. Lyon, and J.A. Fedder, *Geophys. Res. Letts.*, 28, 3, 487-490, 2001.
 214. Gamma ray flashes by plasma effects in the middle atmosphere, P.K. Kaw, G.M. Milikh, A.S. Sharma, P.N. Guzdar, and K. Papadopoulos, *Phys. of Plasmas*, 8(11), 4954-4959, 2001.
 215. The role and form of modeling in space weather, K. Papadopoulos, I.A. Daglis (ed), *Space Storms and Space Weather Hazards*, 389-340, 2001.
 216. Modeling substorms dynamics of the magnetosphere: from self-organization and self-organized criticality to nonequilibrium phase transitions, M.I. Sitnov, A.S. Sharma, K. Papadopoulos, and D. Vassiliadis, *Phys. Rev. E*, 65, 016116, 2001.
 217. Three-dimensional MHD simulations of the earths magnetosphere on Feb 9-10, 1995 for northward interplanetary magnetic field and comparison of the lbe field with Geotail observations, X. Shao, P.N. Guzdar, K. Papadopoulos, C.C. Goodrich, A.S. Sharma, G.M. Milikh, M.J. Wiltberger, and J.G. Lyon, *Geophys. Res. Lett.*, 28, 20, 3835-3838, 2001.
 218. Conversion of electrostatic to electromagnetic waves by superluminous ionization fronts, D. Hashimshony, A. Zigler, and K. Papadopoulos, *Phys. Rev. Lett.*, 86(13), 2806-2809, 2001.

219. Combining global and multi-scale features in description of the solar wind-magnetosphere coupling, A.Y. Ukhorskiy, M.I. Sitnov, A.S. Sharma, and K. Papadopoulos, in press, *Annales, Geophysise*, 2002.
220. Modeling and forecasting of the multi-scale features of magnetospheric dynamics during substorms, A.Y. Ukhorskiy, M.I. Sitnov, A.S. Sharma, and K. Papadopoulos, Sixth International Conference on Substorms, March 25-29, 2002, Seattle, Washington.
221. Comparing ground magnetic field perturbations from global MHD simulations with magnetometer data for Jan. 10, 1997 magnetic storm event, X. Shao, P.N. Guzdar, G.M. Milikh, K. Papadopoulos, C.C. Goodrich, A.S. Sharma, E. Burns, M.J. Wiltberger, and J.G. Lyon, *J. Geophys. Res.*, 107A, 1029/2000JA000445, 2002.
222. Global and multiscale aspects of magnetosphere dynamics in local-linear filters, A.Y. Ukhorskiy, M.I. Sitnov, A.S. Sharma, and K. Papadopoulos, *J. Geophys. Res.*, 107(A11), 1369, doi:10.1029/2001JA009160, 107, 2002.
223. Tunable, Bandwidth Controllable, Source of THz Radiation, D. Hashimshony, A. Zigler, and K. Papadopoulos, *IEE P-OPTOELECTRON* 149, (3): 93-97-, June 2002.
224. Phase transition-like behavior of magnetospheric substorms: Global MHD simulations results, X. Shao, M.I. Sitnov, A.S. Sharma, K. Papadopoulos, C.C. Goodrich, P.N. Guzdar, G.M. Milikh, M. Wiltberger, and J.G. Lyon, *J. Geophys.*, 108, DOI 10.1029/2001JA0009237, 2003.
225. On the efficiency of ELF/VLF generation using HF heating of the auroral electrojet, K. Papadopoulos, T. Wallace, M. McCarrick, G.M. Milikh, and X. Yang, *Plasma Physics Reports*, vol. 29, no. 7, 561-565, 2003.
226. Effects of the solar wind electric field and ionospheric conductance on the cross polar cap potential: results of global MHD modeling, V.G. Merkine, K. Papadopoulos, X. Shao, G. Milikh, A.S. Sharma, J. Lyon, M. Wiltberger, and C. Goodrich, *Geophys. Res. Lett.*, 30(23), 2180, doi:10.1029/2003GL017903, 2003.
227. Global and multi-scale features of solar wind-magnetosphere coupling: from modeling to forecasting, A.Y. Ukhorskiy, M.I. Sitnov, A.S. Sharma, and K. Papadopoulos, *Geophys. Res. Letts.*, 31, L08802, 2004.
228. Relationship between ionospheric conductance, field aligned current and magnetopause geometry: Global MHD simulations, V.G. Merkine, K. Papadopoulos, A.S. Sharma, G. Milikh, J. Lyon, and C. Goodrich, *Planet. Space Sci.*, 53(9), 873-879, 2005.
229. Global MHD simulations of strongly driven magnetosphere: towards understanding of the transpolar potential saturation, V.G. Merkine, A.S. Sharma, K. Papadopoulos, G.M. Milikh, J. Lyon and C. Goodrich, *J. Geophys. Res.*, 110, A09203, doi:10.1029/2004JA010993, 2005.
230. Investigation of 3D energetic particle transport inside quiet-time magnetosphere using particle tracing in global MHD model, X. Shao, S.F. Fung, L.C. Tan, K. Papadopoulos, M. Wiltberger, and M.C. Fok, *The Inner Magnetosphere: Physics and Modeling*, Geophysical Monograph Series 155, 10.1029/155GM33, 2005.
231. The magnetic response of the ionosphere to pulsed HF heating, K. Papadopoulos, T. Wallace, G.M. Milikh, W. Peter, and M. McCarrick, *GRL*, vol. 32, L13101, doi:10.1029/2005GL023185, 2005.
232. Effect of anomalous electron heating on the transpolar potential in the LFM

- global MHD model, V.G. Merkin, G.M. Milikh, A.S. Sharma, K. Papadopoulos, J. Lyon, and C. Goodrich, *Geophys. Res. Lett.*, 32, L22101, doi:10.1029/2005GL023315, 2005.
233. Tunable THz Generation by the interaction of a super-luminous laser pulse with biased semiconductor plasma, K. Papadopoulos and A. Zigler, 7th Workshop High Energy density and High Power RF, AIP Conference Proceedings, vol. 807, 379-389, 10.1063/1.2158802, 2006.
 234. Reply to comment on “The magnetic response of the ionosphere to pulsed HF heating”, K. Papadopoulos, T. Wallace, G.M. Milikh, W. Peter, M. McCarrick and C.L. Chang, *Geophys. Res. Lett.*, vol. 33, L07103, doi: 10.1029/2005GL025253, 2006.
 235. An interhemispheric model of artificial ionosphere ducts, R.P. Perrie, C.M. Milikh, K. Papadopoulos, J.D. Huba, G. Joyce, M. Swisdak and Y. Dimant, *Radio Sci.*, vol. 41, RS4002, doi:10.1029/2005RS003371, 2006.
 236. A global MHD simulation of an event with quasi-steady northward IMF component, V.K. Merkin, J.G. Lyon, B.J. Anderson, H. Korth, C.C. Goodrich, K. Papadopoulos, *ANGEOS*, vol. 25, pp. 1345-1358, SRef-ID: 1432-0576/angeo/2007-25-1325, 2007.
 237. Enhanced ionospheric ELF/VLF generation efficiency by multiple timescale modulated heating, G.M. Milikh and K. Papadopoulos, *Geophys. Res. Lett.*, 34, L20804, doi:10.1029/2007GL031518, 2007.
 238. Particle-in-cell simulation of resonant-cavity-enhanced extraordinary transmission through sub-wavelength plasmonic structure, *Semiconductor Device Research Symposium, 2007 International*, 10.1109/ISDRS.2007.4422535, 1-2.
 239. Generation and evolution of intense ion-cyclotron turbulence by artificial plasma, G. Ganguli, L. Rudakov, M. Mithaiwala and K. Papadopoulos, *J. of Geoph. Res.*, 112, A06231, 2007.
 240. Generation of controlled radiation sources in the a dual femtosecond/nanosecond laser pulse, Z. Henis, G. Milikh, K. Papadopoulos, and A. Zigler, *J. Applied Phys.*, *J. of Applied Physics*, 103, 103111, 2008.
 241. Numerical study of mode conversion between lower hybrid and whistler waves on short-scale density striations, B. Ellisson and K. Papadopoulos, *JGR*, 113, A09315, doi:10.1029/2008JA13261, 2008.
 242. Formation of artificial ionospheric ducts, G.M. Milikh, K. Papadopoulos, H. Shroff, C.L. Chang, T. Wallace, E.V. Mishin, M. Parrot and J.J. Bethelier, vol. 35, L17104, doi:10.1029/2088GL034630, 2008.
 243. Generation of controlled radiation sources in the dual femtosecond/nanosecond laers pluse, Z. Henis, G. Milikh, K. Papadopoulos and Z. Zigler, *J. Applied Physics*, 103, 103111, 2008.
 244. Helicon waves in the magnetotail, G.S. Lakhina, A.S. Sharma and K. Papadopoulos, *J. Geoph. Res.*, vol. 114, A07203, doi:10.1029/2008JA013905, 2009.
 245. Control of the energetic proton flux in the inner radiation belt by artificial means, X. Shao, K. Papadopoulos and A.S. Sharma, *J. Geoph. Res.*, vol. 114, A07214, doi:10.1029JA014066, 2009.
 246. Penetration of ELF currents and electromagnetic fields into the Earth’s equatorial ionosphere, *J. Geophys. Res.*, 114, A10201, doi:10.1029/2009JA014213, 2009.

247. Generation of polarized shear Alfvén waves by rotating magnetic field source, A. Gigliotti, W. Gekelman, P. Pribyl, S. Vincena, A. Karavaev, X. Shao, A. Surjalal Sharma, and D. Papadopoulos, *Physics of Plasmas*, 16, 092106, 2009.
248. Effect of frequency modulation on whistler-mode waves in the magnetosphere, A.V. Streltsov, M. Golkowski, U.S. Inan, K. Papadopoulos, *J. Geophys. Res.*, 114, A08214, doi:10.1029/2009JA014155, 2009.
249. Reduction of energetic proton lifetime in the inner radiation belt by artificial means, K. Papadopoulos and X. Shao, 2009.
250. Model for artificial ionospheric duct formation due to HF heating, G.M. Milikh, A.G. Demenkhov, K. Papadopoulos, A. Vartanyan, J.D. Huba, and G. Joyce, *Geophys. Res. Lett.*, 37(7), L07803, doi:10.1029/2010GL043684, 2010.
251. Propagation of whistler mode waves with a modulated frequency in the magnetosphere, A.V. Streltsov, M. Golkowski, U.S. Inan, and K. Papadopoulos, *J. Geophys. Res.*, 115, A09209, doi:10.2009JA015155, 2010.
252. Generation of whistler waves by a rotating magnetic field source, A.V. Karavaev, N.A. Gumerov, K. Papadopoulos, X. Shao, A.S. Sharma, W. Gekelman, A. Gigliotti, P. Pribyl and S. Vincena, *Physics of Plasmas*, 17, 012102, 2010.
253. Efficient spectral and pseudospectral algorithms for 3D simulations of whistler-mode waves in a plasma, N.A. Gumerov, A.V. Karavaev, A.S. Sharma, X. Shao and K. Papadopoulos, *J. of Computational Physics*, 230, 2605-2619, 2011.
254. Generation of shear Alfvén waves by a rotating magnetic field source: 3D simulations, A.V. Karavaev, N.A. Gumerov, K. Papadopoulos, X. Shao, A.S. Sharma, W. Gekelman, A. Gigliotti, P. Pribyl and S. Vincena, *Phys. Plasmas* 18, 032113, 2011.
255. Pitch angle scattering of electrons by waves generated by a rotating magnetic field source, A.V. Karavaev, N.A. Gumerov, A.S. Sharma, K. Papadopoulos, X. Shao, Y. Wang, W. Gekelman and P. Pribyl, to be submitted, 2011.
256. Focusing of HF radio waves by ionospheric ducts, G.M. Milikh, A. Vartanyan, D. Papadopoulos, and M. Parrott, *J. Atmosph. Solar-Terr. Phys.*, in press, 2011.
257. HF-driven currents in the polar ionosphere, K. Papadopoulos, N.A. Gumerov, X. Shao, I. Doxas, and C. L. Chang, *Geophys. Res. Lett.*, 38, L122103, doi: 10.1029/2100GL047368, 2011.
258. First demonstration of HF-driven ionospheric currents, K. Papadopoulos, C.-L. Chang, J. Labenski, and T. Wallace, *Geophys. Res. Lett.*, 38, L20107, doi:10.1029/2011GL049263, 2011.
259. Evidence for the oscillating two stream instability and spatial collapse of Langmuir Waves in a solar type III Radio Burst, R. J. Thejappa, R. J. MacDowall, M. Bergamo, and K. Papadopoulos, *Ap. J. Lett.*, 747, L1, doi: 10.1088/2041-8205/767/1/4, 2012
260. Attenuation of whistler waves through conversion to lower hybrid waves in the low-altitude ionosphere, Shao X., B. Eliasson, A. S. Sharma, G. M. Milikh, and K. Papadopoulos, *J. Geophys. Res.*, doi:10.1029/2011JA017339, 2012.
261. Numerical modeling of artificial ionospheric layers driven by high-power HF-heating, Eliasson, B., X. Shao, G. M. Milikh, E. V. Mishin, and K. D. Papadopoulos *J. Geophys. Res.*, 117, A10321, doi:10.1029/2012JA018105, 2012.
262. Artificial ducts caused by HF heating of the ionosphere by HAARP, Vartanyan, A., G. M. Milikh, E. V. Mishin, M. Parrot, I. A. Galkin, B. Reinisch, J. Huba, G. Joyce and K. Papadopoulos, *J. Geophys. Res.*, 117, A10307, doi:10.1029/2012JA017563, 2012.

263. Generation of ELF and ULF electromagnetic waves by modulated heating of the ionospheric F2 region B. Eliasson, C.-L. Chang, and K. Papadopoulos *J. Geophys. Res.* 117, A10320, doi:10.1029/2012JA017935, 2012
264. Scattering of Magnetic Mirror Trapped Fast Electrons by Shear Alfvén Wave, Y. Wang, W. Gekelman, P. Pribyl, and K. Papadopoulos, *Phys. Rev. Lett.* 108, 105002, doi: 10.1103/PhysRevLett.108.105002, 2012.
265. Enhanced loss of magnetic-mirror-trapped fast electrons by a shear Alfvén wave, Y. Wang, W. Gekelman, P. Pribyl, and K. Papadopoulos, *Physics of Plasmas* (Communicated) 2013

II. BOOKS

“Waves and Instabilities in Space Plasmas”, ed. P. Palmadesso and K. Papadopoulos, D. Reidel Co., Holland, 1979.

“Solar Terrestrial Physics: Present and Future”, ed. D.M. Butler and K. Papadopoulos, NASA, NASA Reference Publication 1120, 1984.

III. PATENTS (TOTAL 8)

1. High power low frequency communications by ionospheric modification, US 5053783 A, 1991
2. Ground global tomography (CGT) using modulation of the ionospheric electrojets, US 5777476 A, 1996
3. Magnetized photoconductive semiconductor switch, US 5808349 A, 1998
4. Elf/Vlf wave generator using a virtual vertical electric dipole, WO 2006026052 A2, 2006
5. Radiation-protection device, US 8059332 B2, 2011
6. Method and apparatus for establishing low frequency/ultra low frequency and very low frequency communications, US 8299936 B2, 2012
7. System and method for reducing trapped energetic proton or energetic electron flux at low earth orbits, US 20130181145 A1, 2013
8. Laser proton acceleration for production of radionuclides, Patent pending (case # 61807218), 201

VI. INVITED PRESENTATIONS [NATIONAL AND INTERNATIONAL MEETINGS ONLY] – [TOTAL 138]

1. Destruction of a Magnetic Mirror-Trapped Hot Electron Ring by a shear Alfvén Wave; Y. Wang, W. Gekelman, P. Pribyl, D. Papadopoulos' Invited Presentation 55th Annual Meeting of the APS Division of Plasma Physics, Nov. 12, 2013
2. Using Active Experiments to Probe Geo-space, Third International Conference: The Mechanics of the Magnetospheric System and Effects on the Polar Region, Torres del Paine, Patagonia, Chile, October 27- November 1, 2013
3. Controlled Wave Particle Interaction Studies in the Radiation Belts, Invited Presentation to Resonance Workshop September, 19, 2013, Kiev, Ukraine
4. Using Ionospheric Heaters to Explore the Physics of the Radiation Belts, Invited Talk to the 2013 Radiation Belt Workshop, June 30-July 3, 2013, Santorini, Greece
5. Langmuir Solitons and their Role in Artificial Ionization in Ionospheric Heating Experiments, Symposium "The Power of Plasma Theory," Leonid Rudakov 80th May 4, 2013, LaJolla, Ca
6. New Results on Artificial Plasma Layers; Combining the old with the new Invited Presentation, 19th Ionospheric Interactions Workshop April 23, 2013 Arecibo, PR
7. Controlled Wave Particle Interaction Studies in the Radiation Belts, Invited Presentation to Resonance Workshop September, 19, 2012, Kiev, Ukraine
8. Injection of Shear Alfvén Waves in the Inner Radiation Belt Using Arecibo Heater, Invited Talk to the 8th Annual RF Ionospheric Interactions Workshop 15-18 April, 2012, Santa Fe, NM
9. Shear Alfvén Wave Injection in the Magnetosphere by Ionospheric Modifications in the Absence of Electrojet Currents, Invited Presentation Session SM 34A, AGU 2011 Fall Meeting, December 7, 2011, San Francisco.
10. Space as an Open Nonlinear Plasma Laboratory, Invited Presentation Session BM10, 53rd Annual Meeting of the APS, Plasma Physics Division, Salt Lake City, Utah, November 14, 2011.
11. Controlled Wave Particle Interaction Studies in the Radiation Belts, HAARP/ Resonance Workshop, November 8, 2011, UMCP.

12. Controlled Wave Particle Interaction Studies in the Radiation Belt, RBSP IWG APL, May 23, 2011.
13. Injection of shear Alfvén Waves in the Radiation Belts using Arecibo, The Seventeenth Annual RF Ionospheric Interactions Workshop 17-20 April 2011 Santa Fe, New Mexico
14. Fundamental Physics Issues on Radiation Belts and Remediation, Invited Presentation at the 16th Annual RF ionospheric Interactions Workshop, April 20, 2010.
15. Fundamental Physics Issues on Radiation Belts and Remediation, Interim Review December 12, 2010 San Francisco, CA.
16. Space Radiation Environment and Reliability, invited talk, 34th Annual COMACT Conference, Orlando, FL, March 15-20, 2009.
17. Ionospheric ELF/ULF Generation without Needing Electrojets, invited presentation 15th Annual RF Ionospheric Interactions Workshop, Boulder, CO, April 21, 2009.
18. Using Space As a Nonlinear Plasma Laboratory, Presented at the 50th Annual Meeting of the Division of Plasma Physics, Dallas, TX, November 18, 2008.
19. Testing Plasma Physics in the Ionosphere, paper (D35), Presented at the 37th COSPAR Scientific Assembly, Montreal, CA, July 13-19, 2008.
20. The Ionosphere as an Open Plasma Laboratory - Celebration of 50th Anniversary of Sputnik, Russia Academy of Science, October 2007.
21. On the Interaction of Short Pulse Lasers with Semiconductors and Nano-Structures and its Technological Implications, Moscow, Russia, May 24, 2006.
22. ELF Generation and Propagation: Polar vs. Equatorial, February 28, 2006.
23. On the Physics of Ionospheric Heating and its Applications to Underground Exploration and Radiation Belt Control, Taipei, 2005.
24. Ionospheric VLF/ELF Generation, PARS Summer School, August 22, 2005.
25. Plasma Physics in Space the Applications View-Point, COSPAR, 2004.
26. Satellite Threat Due to High Altitude Nuclear Detonations, US Congress, 2004.
27. Effect of the Anomalous Electron Heating on the Ionospheric Potential in the LFM Global MHD Model, AGU Fall Meeting, San Francisco, CA, December 16, 2004.
28. Diagnostics for ELF/VLF Generation, the Tenth Annual RF Generation Ionosphere Interactions Workshop, Santa Fe, NM, April 18-21, 2004.
29. On the Physics of Artificially Stimulated Emissions (ASE), URSI Meeting, Boulder, Colorado, January 7, 2004.
30. Theory of Stimulated VLF Emissions a Review, Presentation to AFRL Workshop on Stimulated Precipitation of Energetic Particles, Stanford, CA, January 28-30, 2003.
31. HAARP A New Revolutionary Facility for Remote Sensing and Space Weather Applications, NATO Advanced Research Workshop Effects of Space Weather on Technology Infrastructure (ESPRIT), Rhodes, Greece March 25-29, 2003.
32. Brief Review of Space Weapons Systems, Presentation to "Future of Space" Meeting, Paris, France, April 1-2, 2003.
33. Plasma Physics in Space the Applications View-Point, Presentation in Symposium Honoring Leonid Rudakov 70th Birthday, May 15, 2003.

34. "The Threat: Nuclear Detonation in Space", The Federation of American Scientists, Panel on Weaponization of Space, Boston, Mass, July 2003.
35. Waves and Instabilities in Space Plasma, Tutorial presented at the Summer School on Basic Processes of Turbulent Plasmas, Halkidiki, Greece, September 22-25, 2003.
36. "Efficiency Scaling for Ionospheric ELF/VLF Generation, Holland, August 2002.
37. "COSPAR – Plasma Physics in Space – The Applications View Point",
38. ELF/VLF Generation in the Ionosphere State of the Art, Presentation to PARS Workshop, November 4, 2001.
39. "ELF Conversion Efficiency", at the Seventh Annual RF Ionospheric Interactions Workshop, Santa Fe, New Mexico, 29 April – 2 May 2001.
40. "The Role and Form of Modeling in Space Weather" (tutorial lecture), NATO Advanced Institute on Space Storms and Space Weather Hazards, Crete, Greece, June 22, 2000.
41. "Physics of Ionospheric VLF/ELF/ULF Generation and their use for Underground Imaging", January 14, 1999.
42. "Collisionless Shocks", Centennial APS Meeting, Atlanta, GA, March 24, 1999.
43. RF Ionospheric Interactions Workshop, Santa Fe, NM, April 14, 1999.
44. "Magnetospheric Modeling for Space Weather", University of Maryland, Meteorology Dept., October 21, 1999.
45. "Lighting", University of Maryland, East West Space Science Center, November 5, 1998.
46. "Low Frequency EM Imaging Using Only Magnetic Field Measurements", DARPA, October 15, 1998.
47. "On the Physics of Ionospheric VLF/ELF/ULF Generation and their Applications", University of Maryland, September 28, 1998.
48. "Modifying the Ionosphere to Image the Underground", Cambridge Symposium/Workshop on the Physics of Space Plasmas, Cascais, Portugal, June 29, 1998.
49. "On the Physics of Low Frequency Underground Imaging", DARPA, June 1998.
50. "From MT to GGT", presentation to Defense Intelligence Agency, April 1998.
51. "Tutorial Review – On the Physics of Ionospheric VLF/ELF/ULF Generation and their Applications", HAARP Santa Fe Meeting, New Mexico, April 19, 1998.
52. "Modeling of Geospace: An ISTP View of Substorms", 1998 Yosemite Workshop, Toward Solar Max 2000: The Present Achievements and Future Opportunities of ISTP and GEM, Yosemite, CA, February 10, 1998.
53. "ISTP Theory Examples", ISTP Meeting, Goddard Space Flight Center, Greenbelt, MD, November 5, 1997.
54. "The Physics of Substorms as Revealed by the ISTP", Symposium on Solar-Terrestrial Coupling Processes, Paros, Greece, June 23-27, 1997.
55. "Current Collection in Space Plasma from Langmuir to TSS-1R", Symposium on Solar-Terrestrial Coupling Processes, Paros, Greece, June 23-27, 1997.
56. "Computer Simulation of an Isolated Substorm: March 9, 1995", International Symposium Chapman Conference on "The Earth's Magnetotail: New Perspectives", Kanazawa, Japan, November 4-8, 1996.
57. "The TSS-1R Results – the Physics of Current Collection in Magnetized Plasmas Revised", American Physical Society Annual Meeting, November 11-15, 1996.

58. "Global MHD Simulations in Support of ISTP", International Symposium Encounter between Global Observations and Models in the ISTP ERA, Huntsville, AL, September 15-20, 1996.
59. "ELF Generation and Remote Sensing with Ionospheric Sources", General Assembly International Union of Radio Science, August 28 – September 5, 1996.
60. "The New "FACE" of Lightning, Red Sprites, Blue Jets and Gamma Rays, AAAS Meeting, Baltimore, Maryland, February 9, 1996.
61. "The New Face of Lightning – Red Sprites/Blue Jets/Gamma Ray Bursts/Radio Bursts", Hellenic Astronomical Society Meeting, Thessaloniki, Greece, June 29, 1995.
62. "The Plasma Physics of the TSS", TSS-R Astronaut Training Sessions, JSFC, Texas, May 10, 1995.
63. "Physics and Applications of Ionospheric VLF/ELF/ULF Generation", High Power RF Ionospheric Modification Workshop, Santa Fe, NM, April 22-26, 1995.
64. "The New "Face" of Lightning Optical Flashes, Gamma and Radio Bursts above the Clouds", 1995 Cambridge Symposium Workshop, Bermuda, February 20-25, 1995.
65. "High Altitude Lightning", Symposium Workshop for Bruno Coppi's 60th Birthday, MIT, Boston, Mass., January 19-20, 1995.
66. "Helicons in Ionospheric Modification Experiments", National Radio Science Meeting, Denver, CO, 1995.
67. "The Importance of the Helicon Mode on the Physics of the Lower Ionosphere", URSI, Boulder, CO, January 3-5, 1995.
68. "Response of a Magnetized Semiconductor Plasma to a Laser Pulse", Symposium on Strong Electromagnetic Field Interaction with Plasmas, College Park, MD, August 30, 1994.
69. "Applications & Research Opportunities Using HAARP", IV Suzdal URSI Symposium, Uppsala, Sweden, August 15-19, 1994.
70. "Transport Processes in Space Plasma – Conventional Thinking and New Trends", Gordon Research Conf. on Solar-Terrestrial Physics, Wolfeboro, NH, June 22, 1994.
71. "Overview of ELF/VLF Theoretical Program", NPRSC 1993 Workshop on Modification and Diagnosis of the Polar Ionosphere, UCLA, April 28-30, 1993.
72. "Remote Spectroscopy of the Atmosphere", Albuquerque, New Mexico, May 10, 1993.
73. "Helicons in Ionospheric Modifications Experiments", AGU Conference, San Francisco, CA, December 6, 1993.
74. "Transport Processes in Space Plasmas", AGU Chapman Conference, Linhue, Hawaii, February 17-21, 1992.
75. "Critical Ionization Velocity in Space", AIAA 30th Aerospace Science Meeting, Reno, Nevada, January 7-10, 1992.
76. "Status of ELF/VLF Generation", National Polar Radio-science Consortium (NPRSC) Workshop, Stanford, CA, April 1-3, 1992.
77. "Theoretical and Modeling Efforts in ISTP", IACG Workshop, Airle, Virginia, June 1-3, 1992.
78. "CIV Primary Instability", World Space Congress, Washington, DC, August 29, 1992.

79. "The Next Logical Step in Ionospheric Heaters", 3rd Suzdal Symposium on Ionospheric Modifications, Suzdal, USSR, September 10-15, 1991.
80. "The Role of Neutrals in Spacecraft Charging", Int. Meeting on Electrodynamics Tether, Varenna, Italy, September 20-25, 1991.
81. "CIV Triggering in Ba Injection Experiments", AGU-MSA Spring Meeting, Baltimore, MD, May 28-31, 1991.
82. "Review of Weakly Magnetized Plasma Processes in the Ionosphere", HAARP Diagnostics Workshop, Phillips Lab., Boston, Mass, May 1991.
83. "Future Directions for Numerical Simulations in Space Plasmas", XXIIIrd General Assembly of the URSI, Prague, Czechoslovakia, August 28 – September 5, 1990.
84. "A Comprehensive Analysis of Ba Injection Critical Velocity Experiments", XXVIII COSPAR Plenary Meeting, Hague, Holland, July 1990.
85. "Electrojet Modulation ELF Communications", Advisory Group for Aerospace Research and Development, Bergen, Norway, June 1990.
86. "Recent Developments in Ionospheric Heating Radio Waves", Topical Conference on Research Trends in Nonlinear and Relativistic Effects in Plasmas, La Jolla Institute, San Diego, February 5-8, 1990.
87. "The Physics of Ionospheric Breakdown", Nonlinear Dynamics Conference, Ukrainian Academy of Sciences, October 1989.
88. "The Physics and Limitations of Low Frequency Wave Emissions by Beam Injection in Space", Workshop on Active Experiments, Northwestern University, September 14-16, 1988.
89. "Review of Ion Beam Propagation in Space", Chapman Conference, Japan, October 1987.
90. "Theoretical Guide to Future Computer Simulation in Space", XXII General Assembly of URSI, Tel Aviv, Israel, September 1987.
91. "RF Acceleration of Electrons in Space", XXXI General Assembly of URSI, Tel Aviv, Israel, September 1987.
92. "Current Understanding and Issues on Electron Beam Injection in Space", COSPAR Meeting, Toulouse, France, July 1-6, 1986.
93. "Theory of Nonlinear RF Plasma Interactions in Electron Acceleration in the Ionosphere", Workshop on RF Interactions with Laboratory on Space Plasma, UCLA, Los Angeles, CA, April 1-2, 1986.
94. "Spontaneous Generation of ULF/ELF/VLF Current Loops in the Ionosphere", USRI General Meeting, Boulder, CO, January 13-15, 1986.
95. "Neutral Gas Plasma Interactions in Space", International School for Plasma Simulations, Kauai, Hawaii, February 3-16, 1985.
96. "Physics of Critical Ionization Velocity", Trieste Plasma Physics College, Trieste, Italy, May 27 – June 4, 1985.
97. "On the Shuttle Glow", First Workshop on Spacecraft Glow, Huntsville, Alabama, 1984.
98. "The Microphysics of Collisionless Shocks", AGU Chapman Conference on Collisionless Shocks, Napa Valley, CA, February 1984.
99. "Early Ionization and Coupling of AMPTE Releases to the Solar Wind Plasma", Fall AGU Meeting, San Francisco, CA, December 5-9, 1983.

100. "Neutral Gas Plasma Interactions and Critical Ionization Phenomena in Space", Twenty-fifth Annual Meeting of the Division of Plasma Physics, Los Angeles, CA, November 7-11, 1983.
101. "Review of Ionospheric VLF and ELF Injections", International Symposium on Active Experiments in Space, Alpbach, Austria, May 24-28, 1983.
102. "Electron and Ion Beam Driven Plasma Discharges with Collective Dissipation", Workshop on the Critical Velocity Effect, Munich, Germany, October 11-13, 1982.
103. "Studies of the Earth's Bow Shock and Solar Energetic Electrons", AGU Fall Meeting, San Francisco, CA, December 1981.
104. "Plasma Lasers in Space", First International School of Plasma Astrophysics, Varenna, Italy, August 1981.
105. "Theory of High Mach Number Magnetosonic Shocks", ISEE Working Group Meeting, Meudon, France, July 1981.
106. "Critical Problems of High Mach Number Shocks", Gordon Conference in Space Plasmas, Wolfsboro, NH, June 22-26, 1981.
107. "Beam Experiments from the Space Shuttle", IEEE Conference, Los Angeles, June 1981.
108. "Review of Space Plasma Simulations", IMS Assessment Symposium, Goddard Space Flight Center, May 20-22, 1981.
109. "Strong Turbulence and its Effects on D.C. Resistivity on Auroral Field Lines", AGU Spring Meeting, Baltimore, MD, May 1981.
110. "The Theory of Beam Plasma Discharge", NATO Advanced Research Institute in Active experiments in Space, Geilo, Norway, April 21-25, 1981.
111. 2nd Triannual Greek Physical Society Meeting, Lesvos, Greece, September 18-21, 1980.
112. "Radio Physics of the Sun", IAU Symposium No. 86, College Park, MD, August 1-10, 1979.
113. Discussion Leader, Gordon Conference on Space Plasmas, June 1979.
114. School of Nonlinear Plasma Physics, Kiev, U.S.S.R., September 1979.
115. AGU Chapman Conference on Magnetospheric Substorms, Los Alamos, NM, October 1978.
116. International School on Plasma Physics, "Diagnostics for Fusion Plasmas", Varenna, Italy, September 1978.
117. European Geophys. Soc. Meeting., Strassburg, France, August 1978.
118. Workshop on Planetary and Astrophysical Magnetospheres, Snowmass, CO, August 1978.
119. APS Spring Meeting, Washington, DC, April 1978.
120. Invited Lecturer, International Magnetospheric Study (JMS) Boulder, CO, March 1978.
121. N.C. Christophilos Memorial Conference, Spetses, Greece, July 1977.
122. Invited Lecturer "Workshop on the Physics of Astrophysical Plasmas", Aspen, Co, June 1977.
123. Sixth International Conference on Plasma Physics and Controlled Nuclear fusion Research, Berchtesgaden, Germany, October 1976.
124. Invited Lecturer "International School of Plasma Physics" organized by the Georgian Academy of Science, Tbilissi, U.S.S.R., September 1976.

125. Gordon Conference on Plasma Physics (discussion leader), June 1976.
126. COSPAR Symposium on Active Experiments in Space, Boulder, CO, June 1976.
127. Annual U.R.S.I. Meeting, Boulder, CO, October 1975.
128. Thirteenth International Assembly I.A.G.A., Grenoble, France, September 1975.
129. Gordon Conference on Plasma Physics (discussion leader), June 1975.
130. I.E.E.E. Conference on Plasma Physics, Ann Arbor, May 1975.
131. Conference on Type III Solar Burst, Berkeley, CA, May 1975.
132. N.A.S.A. Workshop on Plasma Simulation, Washington, DC, January 1975.
133. Fifth International Conference on Plasma Physics and Controlled Nuclear Fusion Research, Tokyo, Japan, November 1974.
134. European Geophys. Soc. Meeting, Trieste, Italy, September 1974.
135. Plasma Astrophysics Workshop, Lake Tahoe, July 1974.
136. Substorm Conference, Bryce Mt., June 1974.
137. Asilomar Conference on Solar Wind, April 1974.
138. APS. Plasma Physics Meeting, Philadelphia, PA, November 1973