George Jarvis Williams, Jr.

The Plasmadynamics and Electric Propulsion Laboratory (PEPL)
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Employment Objective: A position in the research and design of advanced space propulsion systems with emphasis on conceptual and physical design of these systems.

EDUCATION

University of Michigan — September, 1996 through the present
Doctor of Philosophy in Aerospace Engineering — (expected: June, 2000)

Princeton University — September, 1992 through June, 1996
Master of Science in Engineering in Applied Physics — (June 4, 1996)

Auburn University — September, 1986 through June, 1992
Master of Science in Aerospace Engineering — (June 10, 1992)
Bachelor of Aerospace Engineering — (June 8, 1990)

RESEARCH EXPERIENCE

Ion thruster design, fabrication, and testing:

- Modified the design, coordinated the fabrication and assembled an ion engine at LeRC. (LeRC, 1998)
- Enabled and demonstrated flight level (2.5 kW) ion engine operation at PEPL: assembled propellant feed system, clean-room facility, N_2 purge system, and power delivery / telemetry. (PEPL, 1998)
- Coordinated the design and fabrication, assisted in preliminary performance testing, and coordinated the first vibration testing of the pre-engineering model lightweight ion engines. (LeRC, 1992)
- Currently investigating the physical phenomena of high-energy ion production leading to discharge cathode erosion in the NSTAR ion engine. (Supported under Deep Space 4 by NAG-31572.)

Other electric propulsion device operation and investigation:

- Used laser induced fluorescence (LIF) to characterize the PEPL-170 Hall thruster plume reconciling significant discrepancies in published data. (PEPL, 1999)
- Characterized plumes of various hollow cathode assemblies via LIF and probes indicating regions of high-energy ion production which could lead to erosion of the cathode. (PEPL, 1998-1999)
- Conducted preliminary design and testing of space station plasma contactor units. (LeRC, 1992)

Experimental diagnostics:

- Supervise, developed from concept, and demonstrated an LIF diagnostic system. (PEPL, 1998-1999)
- Assembled and used Langmuir probes and a retarding potential analyzer. (PEPL, 1997-1999)
- Conducted laser absorption characterization of ultra-high pressure air. (Princeton, 1994)

Numerical modeling:

- Developed and integrated into a 1-D code physical models of radiative energy addition to a real-gas flow. Critical phenomena such as absorption coefficient variation, chemical and energy-state kinetics, laser saturation, and microwave breakdown were incorporated. (Princeton, 1992-1996)
- Designed and developed a numerical model of a space propulsion system utilizing stored thermal energy. Design of the heat exchanger (heat source, thermal storage material, and physical configuration) and system integration of this exchanger were emphasized. (Auburn, 1990-1992)

EMPLOYMENT (U. S. Citizen)

NASA/OAI Intern:
NASA Lewis Research Center (LeRC), Cleveland, Ohio — April, 1992 through August, 1992

Graduate Research Assistant/Graduate Student Instructor:
Dept. of Aerospace Engineering, The University of Michigan — September, 1996 through the present
Dept. of Mechanical and Aerospace Eng., Princeton University — September, 1992 through June, 1996

TECHNICAL PAPERS AND PRESENTATIONS

"Instabilities and State Populations of the Discharge Plasmas in the FMT-2 Ion Engine and the PEPL-170 Hall Thruster," G. J. Williams, J. M. Haas, T. B. Smith, B. Beal, and A. D. Gallimore, 26th International Electric Propulsion Conference, October, 1999, IEPC 99-104.

"Laser Induced Fluorescence Measurement of the Ion Energy Distribution in the Plume of a Hall Thruster," G. J. Williams, T. B. Smith, F. S. Gulczinski, and A. D. Gallimore, 35th Joint Propulsion Conference, June, 1999, AIAA-99-2424.

"Laser Induced Fluorescence Characterization of Ions Emitted from Hollow Cathodes," G. J. Williams, T. B. Smith, M. T. Domonkos, K. J. Shand, A. D. Gallimore, and R. P. Drake, 35th Joint Propulsion Conference, June, 1999, AIAA-99-2862.

"Near-Field Investigation of Ions Emitted from a Hollow Cathode Assembly Operating at Low-Power," G. J. Williams, M. T. Domonkos, K. J. Shand, J. M. Haas, L. B. King, and A. D. Gallimore, 34th Joint Propulsion Conference, July, 1998, AIAA-98-3658.

"Development of a Single-Orifice Retarding Potential analyzer for Hall Thruster Plume Characterization," C. M. Marrese, N. Majumdar, J. M. Haas, G. J. Williams, L. B. King, and A. D. Gallimore, 25th International Electric Propulsion conference, August, 1997, IEPC 97-066.

"Radiative Energy Addition to High Pressure Supersonic Air," S. Macheret, C. Meinrenken, G. J. Williams, W. Gillespie, W. Lempert, and R. Miles, 27th AIAA Fluid Dynamics Conference, June 1996, AIAA-96-1984.

"Energy Addition and Thermalization Issues in a Radiatively Driven Hypersonic Wind Tunnel," S. Macheret, G. J. Williams, G. Comas, C. Meinrenken, W. Lempert, and R. Miles, 30th AIAA Thermophysics Conference, June, 1995. AIAA 95-2142

"Radiatively Driven Hypersonic Wind Tunnel," R. Miles, G. Brown, W. Lempert, D. Natelson, R. Yetter, J. Guest, G. J. Williams, and S. Bogdonoff, AIAA Journal, ***33*** (8), 1995, 1463-1470.

"Radiatively Driven Hypersonic Wind Tunnel," R. Miles, G. Brown, W. Lempert, D. Natelson, R. Yetter, J. Guest, G. J. Williams, and S. Bogdonoff, 18th AIAA Ground Testing Conference, June 1994. AIAA 94-2472.

"Preliminary Design and Performance Analysis of a Space Propulsion System Utilizing Stored Thermal Energy," G. J. Williams, R. M. Jenkins, and M. F. Rose, Journal of Propulsion and Power, ***10*** (1) 1994, 32-39.

"Derated Ion Thruster Development Status," M. J. Patterson, T. Haag, and G. J. Williams, 29th AIAA Joint Propulsion Conference, June, 1993. AIAA 93-2225.

"Krypton Ion Engine Performance," M. J. Patterson and G. J. Williams, 28th AIAA Joint Propulsion Conference, July, 1992. AIAA 92-3144.

"A Preliminary Design of a Space Propulsion Concept Utilizing Stored Thermal Energy," G. J. Williams, M. F. Rose, and R. M. Jenkins, 28th AIAA Joint Propulsion Conference, July, 1992. AIAA 92-3848

"One-Dimensional Modeling of a Radiatively Driven Hypersonic Wind Tunnel," Master's Thesis, Dept. of Mechanical and Aerospace Engineering, Princeton University, June, 1996.

"Analysis and Preliminary Design of a Space Propulsion System Utilizing Stored Thermal Energy," Master's Thesis, Dept. of Aerospace Engineering, Auburn University, June, 1992.

"An Examination of the Effect of Planetary Magnetic Fields on Spacecraft Trajectory Determination," G. J. Williams, Honors Thesis, 1990 AIAA Southeast Regional Student Conference Presentation.

HONORS

NASA Space Grant Consortium Fellow (1990-1992)
University Scholar, 1990
Outstanding Graduate of the College of Engineering, 1990
Eagle Scout with Double Silver Palms
Engineer in Training Certification
Honoraries: Phi Kappa Phi, Aerospace Engineering, Engineering, Physics, and Mathematics

CURRENT ACTIVITIES

Volunteer, Criminal Justice Ministry, The Catholic Diocese of Lansing
Volunteer, Hunger Coalition of Washtinaw County
Parish Pastoral Council, St. Mary's Student Parish
Recreational tennis, golf, softball, volleyball and dancing.

REFERENCES

Dr. Alec Gallimore
Associate Professor
Dept. of Aerospace Eng.
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Mr. Michael J. Patterson
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Dr. Walter Lempert
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Dept. of Mechanical Engineering
The Ohio State University
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