Richard H. Eskridge

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Work Experience:

Professor Emeritus, The Institute for Exotic Science, PBC.

09/2018 to present

Job Description:

Serving as Professor Emeritus for the Institute, providing the benefit of my 35 years of experience and ideas for guidance to insure the development and success of the Institute programs.

Chief Technical Officer, HoloChron Engineering LLC.

06/2018 to present

Job Description:

Serving as Chief Technical Officer for HoloChron Engineering, LLC. Responsible for development of new programs and consulting for technical viability by providing key scientific insights and experience.

Chief Scientist, Quantum Machines, LLC.

01/2017 to present

Job Description:

Serving as Chief Scientist for Quantum Machines, LLC. I have been responsible for the formulation and experimental testing of a new theory for a novel lifting and propulsion system. I developed a formulation predicting the existence of a non-Newtonian force which has been tested in the laboratory. As Chief Scientist I have directed the work of 3

contracted employees to build experimental hardware and conduct experiments. I also have designed the facilities and specified the equipment for a large- scale laboratory for advancement of this new research.

Aerospace Engineer, Propulsion Systems and Technologies
Technical Advisor for the NASA MSFC Propulsion Research Laboratory

09/2002 to 12/2016

Job Description:

Employed as a GS14 Aerospace Systems Engineer and chief technical adviser for the NASA MSFC Propulsion Research Laboratory (PRL), I was responsible for the development of technology to advance the state of the art of propulsion hardware. I provided key technical insight and experience, supporting the PRL for research in rocket engine ignition technologies, cryogenic on-orbit fluid storage, electric and nuclear propulsion and electric guns for high speed impact testing. I have been engaged in research to develop the first electric thruster based on the formation and acceleration of extremely high velocity "Plasmoids" for which I received a US patent. In addition to these duties, I was in charge of building an "Exploding Wire Gun" for use at the MSFC Impact facility and the worlds fastest micrometeorite gun, a 7 giga-watt plasma gun that produced particles traveling at speeds as high as 23 km/sec. We also conducted a series of experiments for the investigation of electro-gravitic phenomena involving the emission of gravity waves by electrically excited superconductors.

I was co-inventor of a novel Propulsion system dubbed "FIREBALL" (Fusion Ignition Rocket Engine with Ballistic Ablative Lithium Liner), This system is a derivative of the ORION system initiated by Fusion interactions of Tritium and Li-6 with a fast fission U238 tamper. This system offers much more manageable yields (100kg TNT equivalent vs 10 kiloton yield for ORION) in a platform which does not require Plutonium "cores" which are a great proliferation concern. The FIREBALL system would have an inherently high "alpha" (kW/kg) of order 10, which would enable rapid egress to the solar system for exploration and asteroid defense.

Aerospace Engineer, Electric Propulsion Systems - NASA MSFC

03/2002 to 9/2002

Job Description:

Employed as an Electric Propulsion Engineer, I served as GS14 deputy team leader responsible for Space Nuclear Power research. This research included several on-going projects including Field Reversed Configuration plasma thruster, Spheromak/FRC Plasmoid Propulsion Thruster and RF-Heated Dielectrics for simulated fission reactor. As

deputy team leader, I planned, initiated, and guided experimental efforts related to the production of Space Nuclear Power and for high power propulsion research for systems which would utilize nuclear power in space. I was responsible for analyses as required to guide the experimental efforts and serve as an engineering expert to pose solutions to complex engineering problems which cut across multi-disciplinary fields. This role required knowledge and experience in propulsion research and experimentation, plasma processes, electromagnetic radiation, electromagnetics, fluid flow, heat transfer, mechanical and electrical engineering, and for non-intrusive optical, spectrographic and laser diagnostics for advanced propulsion. Both computational and experimental experience was required to fulfill this role. As deputy team lead for Space Nuclear Power, I was also responsible for the acquisition and advancement of new technologies for space power and propulsion

Aerospace Engineer, Electric Propulsion Systems - NASA MSFC

02/1999 to 03/2002

Job Description:

Employed as an Electric Propulsion engineer, I worked as chief engineer for Magnetic Target Fusion Propulsion,Plasma Liner, and Plasmoid Propulsion effort. I designed and supervised the construction of a pulsed power laboratory for electric propulsion and magnetic target fusion propulsion research at MSFC. This facility provides for state of the art research with RF-shielded screen room, ballistic shielding system and isolated power and grounding system essential for pulsed power plasma research. I conducted experiments with a pulsed plasma gun/thruster for advanced fusion plasma propulsion. This gun produced plasmas with velocities exceeding 77 km/sec. These activities required skills in high voltage engineering, hi-speed pulsed power, nanosecond scale trigger systems, high speed data acquisition and control, vacuum system engineering, industrial power, plasma diagnostics, spectrographic instruments, and mechanical engineering.

Electronics Engineer, Electrical Instrumentation Systems - NASA MSFC

10/1995 to 02/1999

Job Description:

Employed as an electrical engineer responsible for conceiving, planning, and completing a wide variety of experiments and developing diagnostics and special instrumentation to

support rocket testing. I acted as a "team lead" directing the efforts of personnel in many disciplines to accomplish these efforts in the test environment. Some of these efforts included: a water spray test facility for cold flow characterization of injectors, a unique facility for optical diagnostics and experimental measurements of high pressure combustors using laser Raman spectroscopy, laser Mie scattering, optical emission and absorption spectroscopy and diagnostics for diagnosis of plume conditions and IR radiation for rocket engines. I also designed, built, and operated many unique systems for mass spectrographic test and characterization of cryogenic leaks in advanced rocket systems.

Aerospace Engineer, Propulsion Flow Dynamics - NASA MSFC

05/1986 to 10/1995

Job Description:

I served as Aerospace engineer responsible for conceiving, initiating, planning, and conducting experimentation and research to address a wide variety of complex technical problems related to liquid and solid propulsion rockets of both conventional and advanced design. I supervised the work of 3 other engineers, 3 technicians and 1 programmer. I served as the "team lead" for the MSFC Combustion Physics laboratory. I was responsible for many research efforts including a hydrogen flat flame burner facility for the development of Infrared Emission/ Absorption Diagnostics, advanced diagnostics for use on the Space Shuttle Main Engine including schlieren, laser, spectrographic and shadowgraph imaging.

Aerospace Engineer, Liquid Propulsion Systems - NASA MSFC

06/1983 to 05/1986

Job Description:

I worked as an Aerospace Engineer responsible for experimental design, planning and operations for the Advanced Laser Plasma Propulsion concept. This work required knowledge of plasma physics, the analytical modeling of plasma properties, and the development of advanced optical non-intrusive diagnostic techniques. I conducted an experiment to investigate and characterize laser-sustained plasmas in air, argon, and hydrogen gases. This effort required theoretical investigation of plasma/ laser interaction processes, the design of experimental plasma thruster hardware, operation, modification and maintenance of a 30 Kw CW CO2 laser. I gained experience with hi/lo vacuum systems, kilovolt power systems, high energy lasers and laser optics, pressurized gas systems, test engineering, and control and data acquisition systems during this time. I took experimental data for a laser-supported argon plasma and determined the 3D temperature field of the plasma at 20000 deg. K. I served as a engineering expert in the

field of laser propulsion and I monitored a computational effort at the University of Tennessee for the design of an experimental laser-powered thruster during this time.

Education:

BS, Mechanical Engineering Technology, University of Tennessee, 1979.
MS, Engineering Science, University of Tennessee, 1982.
Completed all Courses required for PhD, no dissertation, Engineering Science, University of Tennessee, 1983.

Publications:

I have authored or co-authored at least 30 publications
in the field of rocket propulsion and propulsion diagnostics a few of the more relevant ones are:

Martin, A. and Eskridge, R., "Electrical Coupling efficiency of inductive plasma accelerators", J. Phys D. Appl. Phys. **38**(2005) 4168-4179.

Eskridge, R., Martin A., Fimognari, P., "Design and Construction of the PT-1 Plasmoid Thruster", Proceedings of STAIF 2006, Albuquerque, NM

Martin, A., Eskridge R. and Fimognari, P., "FIREBALL: Fusion Ignition Rocket Engine with Ablative Lithium Liner", Proceedings of STAIF 2006, Albuquerque, NM
Martin, A., Eskridge, R., Lee, M., Richeson, J., Smith, J., Thio Y.C., Slough J., "The FAST (FRC Acceleration Space Thruster) Experiment, NASA TR 20010073723, Jan2001.

Thio, Y.C., Eskridge, R. Smith, James, Lee, M., Schmidt, G., "Magnetized Target Fusion Driven by Plasma Liners", NASA TR 20010067645, Jan, 2001.

Wehrmeyer, J. A., J. M. Cramer, R. H. Eskridge, and C. C. Dobson. 2001. "Ultraviolet Raman Diagnostics for Rocket Engine Injector Development." Journal of Propulsion and Power. Vol. 17, No. 1. pp. 27-34.

R. Eskridge and C. Dobson, "Exit Plane Spectrometer for Species Observation in the SSME", NASA Conference Publication 3092, Vol. III, Advanced Earth to Orbit Propulsion Technology Conference, May 1990.

R. Eskridge, R. Hung, Y. Tsao and C. Sung, “Spectroscopic Study of Combustion Diagnostics on Hydroxyl Radicals”, AIAA paper 89-0063, 27th Aerospace Sciences Meeting, Reno, NV, Jan. 1989.

McCay, T.D and R.H. Eskridge, “Experiments on Optical Discharges in Hydrogen”, Journal of Thermophysics and Heat Transfer, Vol. 2., p 317-323, Oct. 1988.
R. Eskridge, T. McCay and D. VanZandt, “An Experimental Study of Laser-Supported Plasmas for Laser Propulsion-Final Report”, NASA TM-86583, Jan 1987.