John W. Brooks

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Education

Ph.D, **Applied Physics - Plasma Physics**, Sept. 2015 to present (Expected Dec. 2019)
Columbia University
- Research Topics: Experamentalist; Tokamak MHD mitigation; Probes; SOL currents
- GPA: 3.86

M.S., **Applied Mathematics**, June 2017
University of Washington, Online
- GPA: 3.71

M.S., **Aerospace Engineering**, July 2010
University of Alabama in Huntsville
- Research Topics: Mitigating combustion instabilities for propulsion applications
- GPA: 4.00

B.S., **Mechanical Engineering** and **Physics**, 2008 and 2012
Georgia Institute of Technology
- Minor: Japanese
- GPA: 3.25

Work Experience

Graduate Research Assistant, Sept. 2015 - present (Expected Dec. 2019)
Plasma Physics Lab at Columbia University in New York, NY
- Studying MHD mode suppression using a personally design probe using self-written computational model and active GPU mode control.
- Published an RSI article on active MHD mode rotation control using a GPU-controller and Langmuir probe actuator.
- Awarded DOE SCGSR fellowship in 2017 to study control theory on plasmas at PPPL.
- Managed 6 undergraduate students on electrical, optical, and mechatronics projects.
- Designed, installed, and operated tokomak triple probes and custom directional probe.
- Presented findings at APS-DPP conference.

Research Engineer I & II, Sept. 2012 - July 2015
Gloyer Taylor Laboratories in Tullahoma, TN
- Performed hardware, electrical, and software development for aerospace applications.
- Projects include (but not limited to): CFD modeling of rocket injectors to improve combustion stability. Managed/operated Vulcan-CFD computer cluster. Designed LH2/LO2 injector for a single-stage-to-orbit rocket. Designed thermoplastic bonding project. Developed PID Power Supply and feedback mechanism for bonding system. Performed material testing of proprietary composite structures. Developed and performed experiments to balance and study flywheel's performance.
- Submitted 7 SBIR/STTR proposals for project funding.

Research Assistant, May 2012 - Aug. 2012
Ultracold Atomic Physics and Quantum Optics Lab at Georgia Tech
- Assisted with Barium ion trap to trap small linear arrays.
- Designed and built a macro-particle ion-trap demo for the lab.

Aerospace Engineer I, Sept. 2010 - May 2011
Digital Solid State Propulsion in Reno, NV
- Assisted in developing electrically controllable solid rocket propellant.
- Performed numerical modeling for solid rocket performance and sizing.
- Designed and fabricated solid rocket motors and a high-pressure testing chamber.
- Directed and assisted in live-fire motor tests.

· Modified, designed, and operated a medium-vacuum chamber.

Graduate Research Assistant, Aug. 2008 - Oct. 2010
Propulsion Research Center at UAHuntsville
· Studied combustion instabilities of gaseous rocket injector.
· Managed team of undergraduates in design and fabrication effort.
· Evaluated and presented research findings at professional conferences.
· Authored/co-authored papers, articles, proceedings, and a thesis.

Undergraduate Research Assistant, May 2005 - Aug. 2007
Laboratory of Aerospace Combustion at Georgia Tech
· Assisted in assembling, maintaining, and operating a gaseous combustor.

Skills

Electrical:	DC and RF Circuits, Soldering, Micro-controllers (Arduino, PIC, Ras. Pi), Oscilloscopes, Eagle PCB, Custom PCB fabrication
Machining:	CNCs, Mills, Lathes, Drills, Table/chop saws, Misc. fabrication
Programming:	Python, C, C++, Cuda, Git, Mathematica, MATLAB, etc.
Computer:	Linux, MSOffice, Hardware assembly and repair, LaTeX, Networking
Engineering:	Engineering design, CAD (Solidworks), CFD (custom code, Vulcan-CFD), PID control systems, Rapid prototyping
Experimental:	High-speed data acquisition, LabVIEW, Instrumentation (Pressure transducers, Thermocouples, Load cells, etc.), Power supplies, Data analysis, Chemiluminescent, Schlieren and high speed imaging
Leadership:	Founded and led SatComms student project to build a satellite ground station and talk with ISS astronauts, CU Ham Radio Club president (two years), Managed junior students/employees, Exec. Committee member and webmaster of CU Makerspace

Papers & Proceedings

[1] J.W. Brooks, et. al. "Active mode rotation control in HBT-EP using biased electrodes", *Rev. of Sci. Inst.* (Accepted, no publication date yet).

[2] J.P. Levesque, J.W. Brooks, et. al. "Measurement of Scrape-off-layer current dynamics during MHD activity and disruptions in HBT-EP", *Nucl. Fusion* **57**, 2017.

[3] Jacob, E. J., Brooks, J. W., "Forced Nonlinear Acoustic Damping in a Rijke Tube and its Application to Combustion Instability Control", *50th AIAA JPC*, 2014.

[4] Brooks, J. W., "Sub-Scale Experimental Combustion Instability Study with a Gaseous Methane Diffusion Flame", *46th AIAA Joint Propulsion Conference*, 2010.

[5] Brooks, J. W., "Evaluating Combustion Instability in a Sub-scale Combustion Experiment with Three Scaling Parameters", *UAHunstville Master's Thesis*, 2010.

[6] Brooks, J. W., "Matching Three Scaling Parameters in a Low-Pressure, Single-Element Combustor", *Region 2 AIAA Student Conference*, April 2010.

Personal Projects

Arduino based antenna tracker for ham radio, Crystal radio, Sonoluminescence, Farnsworld-Hirsch fusor, Plasma speakers (two builds), Paul ion-traps, Custom mini-CNC, Motorized longboard, Sous-vide cooker, Custom hydroponics, Nixie tube clocks (three), and others.

Hobbies

DIY projects (see above), Ham Radio (Extra Class - KF7NFM), Rock climbing, Hiking, Teaching, Ukulele, International travel, Martial arts, Improv. Comedy, Choir/Singing.