

Kunning Gabriel Xu (Gabe)

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EDUCATIONAL BACKGROUND

Degree	Field	Institution	Year
Ph.D.	Aerospace Engineering	Georgia Institute of Technology	2012
M.S.	Aerospace Engineering	Georgia Institute of Technology	2009
B.S.	Aerospace Engineering	Georgia Institute of Technology	2006

EMPLOYMENT HISTORY

Title	Organization	Years
Assistant Professor	Department of Mechanical and Aerospace Engineering University of Alabama in Huntsville Huntsville, AL, USA 35899	2012-present
Research Assistant	School of Aerospace Engineering Georgia Instittue of Technology Atlanta, GA, USA 30332	2006-2012
Engineering Intern	Electron Technologies Inc. L3 Communications Torrance, CA, USA 90505	Summer 2010
Space Scholar	Space Vehicles Branch Air Force Research Lab Hanscom AFB, Bedford, MA, USA 01730	Summer 2006
Undergraduate Research Assistant	High Power Electric Propulsion Lab Georgia Institute of Technology Atlanta, GA, USA 30332	2005-2006
Undergraduate Research Assistant	Georgia Tech Combustion Lab Georgia Institute of Technology Atlanta, GA, USA 30332	2004-2005
Engineering Intern	Boeing Commercial Aircrafts The Boeing Company Seattle, WA, USA 98124	Summer 2004

CURRENT FIELDS OF INTEREST

My group's current research focuses on the study of low-temperature plasma for different applications in propulsion, energy, and materials. Some examples includes plasma based micro-propulsion devices for small satellites, microplasma synthesis of nanoparticles, plant response to plasma exposure, and combustion under electric fields. Our research is experimental in nature and seeks to understand the physics and fundamental interactions between the plasma and other molecules or materials. The goal in most of our work is to develop a predictive understanding of the processes to enable future applications.

I. RESEARCH AND SCHOLARSHIP

Thesis and Publications

Ph.D. Thesis

Title: "*Ion Collimation and In-Channel Potential Control Using In-Channel Electrodes for Hall Thrusters*"

Completed: July 2012

Advisor: Dr. Mitchell Walker

University: Georgia Institute of Technology

Refereed Journal Papers

Xu, K. G., "Measurement of an Atmospheric-Pressure RF Microplasma With Electrostatic Probes," *Physics of Plasmas*, 2015 (In preparation)

Dextre, R. A., Searcy, B. R., Xu, K. G., "Effect of the Split Ring Resonator Width on the Microwave Microplasma Properties," *Plasma Sources Science and Technology*, 2016 (In preparation)

Salvador, P., Xu, K. G., "Examination of Ionic Wind and Cathode Sheath Effects in a E-field Premixed Flame with Ion Density Measurements," *Combustion and Flame*, 2015 (In Review)

Jacobs, S. V., Roy, B., Xu, K. G., "Examination of Ionic Wind and Cathode Sheath Effects in a E-Field Premixed Flame with Ion Density Measurements," *Physics of Plasmas*, 2015 (In Review)

Langendorf, S., Xu, K. G., Walker, M. L. R., "Effect of Wall Electrodes on Hall Effect Thruster Plasma," *Physics of Plasmas*, 22, 023508, 2015.

Xu, K. G., "Plasma Sheath Behavior and Ionic Wind Effect in Electric Field Modified Flames," *Combustion and Flame*, 161, 2014.

Xu, K. G., Walker, M. L. R., "Effect of External Cathode Azimuthal Position on Hall Effect Thruster Plume and Diagnostics" *Journal of Propulsion and Power*, Vol.30, No. 2, 2014.

Xu, K. G, Dao, H., Walker, M. L. R., "Potential Contour Shaping and Sheath Behavior with Wall Electrodes and Near-Wall Magnetic Fields in Hall Thrusters." *Physics of Plasmas*, Vol. 19, No. 10, 2012.

- Xu, K. G., Walker, M. L. R., “Plume Characterization of an Ion Focusing Hall Thruster.” *Journal of Propulsion and Power*, Vol. 28, No. 5, 2012.
- Xu, K. G., Walker, M. L. R., “Technique to Collimate Ions in a Hall Effect Thruster Discharge Chamber,” *Journal of Propulsion and Power*, Vol. 27, No. 3, 2011.
- Xu, K. G., and Walker, M.L.R., “High-Power, Null-Type, Inverted Pendulum Thrust Stand,” *Review of Scientific Instruments*, 80, 2009.

Conference Papers and Presentations

- Dextre, R. A., Searcy, B. R., Xu, K. G., “Confined versus Unconfined Analysis of Split Ring Resonator Microplasma Source in a Microwave Electrothermal Thruster,” *AIAA SciTech 2016 Forum*, San Diego, CA, 2016. AIAA-2016-1945.
- Blair, L. M., Xu, K. G., “Langmuir Probe Diagnostics of an Atmospheric-Pressure Microplasma,” *AIAA Aviation 2015 Forum*, Dallas, TX, 2015. AIAA-2015-2805
- Jacobs, S. V., Xu, K. G., “Electron Temperature in a Methane-Air Flame under a DC Electric Field,” *AIAA Aviation 2015 Forum*, Dallas, TX, 2015. AIAA-2015-2657
- Dextre, R. A., Xu, K. G., “Status of Development and Measurement of a Microwave Microplasma Source for Micropropulsion,” *51st AIAA Joint Propulsion Conference*, Orlando, FL, 2015. AIAA-2015-3724.
- Jacobs, S. V., Roy, B., Xu, K. G., “Measurement of Plasma Activity in a 1D Methane-Air Flame,” *50th AIAA Joint Propulsion Conference*, Cleveland, OH, 2014. AIAA-2014-3982.
- Xu, K.G., Williams, L.T., “Simple Model for Atmospheric Microplasma Sheath.” *41st International Conference on Plasma Science*, Washington, DC, 2014. ICOPS 5C-1.
- Xu, K.G., “Micro-Propulsion Concepts Utilizing Microplasma Generators.” *33rd International Electric Propulsion Conference*, Washington, DC, 2013. IEPC-2013-084
- Kolasinski, K. M., Harlow, W., Xu, K.G., “Optimum Antenna Design for Microplasma Generation.” *2013 IEEE Pulsed Power & Plasma Science Conference*, San Francisco, CA, 2013.
- Xu, K.G., Dao, H., Walker, M. L. R., “Potential Contours in Ion Focusing Hall Thruster.” *48th AIAA Joint Propulsion Conference*, Atlanta, GA, 2012.
- Xu, K.G., Walker, M. L. R., “Plume Characterization of an Ion Focusing Hall Thruster.” *47th AIAA Joint Propulsion Conference*, San Diego, CA, 2011.
- Xu, K.G., Walker, M.L.R., “Technique to Collimate Ions in a Hall Effect Thruster Discharge Chamber,” *57th JANNAP Propulsion Meeting*, Colorado Spring, CO, 2010.
- Zhang, Q., Noble, R., Meyers, A., Xu, K., Lieuwen, T., “Characterization of Fuel Composition Effects in H₂/CO/CH₄ mixtures Upon Lean Blowout,” *ASME/IGTI Turbo Expo*, Reno, NV, 2005.

Recent Research

1. Nanomaterial Formation with Microplasmas
2. Low-Cost Plasma Micropropulsion Using 3-D Printing and Off-the-Shelf Components
3. Dielectric Barrier Discharge for CO₂ Decomposition and Plasma Biomedical Research
4. Characterization of Microwave Microplasma for Space Propulsion and Flow Control
5. The Physiological Effects of Atmospheric Non-Thermal Plasma
6. IIDR Electromagnetic Field Effects on Combustion Kinetics and Instabilities

II. TEACHING

Course Taught

Semester/Year	Course Number & Title
Fall 2012	MAE 310 – Fluid Mechanics 1
Spring 2013	MAE 310 – Fluid Mechanics 1
Spring 2013	MAE 740 - Aerothermodynamics
Fall 2013	MAE 310 – Fluid Mechanics 1
Fall 2013	MAE 468/568 – Elements of Spacecraft Design
Spring 2014	MAE 468/568 – Elements of Spacecraft Design
Spring 2014	MAE 444/544 – Intro to Electric Propulsion
Fall 2014	MAE 468/568 – Elements of Spacecraft Design
Spring 2015	MAE 740 - Aerothermodynamics
Fall 2015	MAE 468/568 – Elements of Spacecraft Design
Fall 2015	MAE 271 – Statics
Spring 2016	MAE 271 – Statics
Spring 2016	MAE 444/544 – Intro to Electric Propulsion

Individual Student Guidance

Ph.D. Students Supervised

Roberto Dextre

Fall 2012 – present

Research topic: Plasma micro-thruster using microwave resonators and 3D printing

M.S. Thesis Students Supervised

Paulo Salvador

Fall 2014 – present

Research area: Effect of electric field geometry on flame behavior

Steven Doyle

Fall 2015 – present

Research area: Atmospheric-pressure microplasma synthesis of nanoparticles

Ethan Hopping

Spring 2016 – present

Research area: Miniature Hall effect thrusters

Stewart Jacobs

Fall 2013 – Fall 2015

Thesis Title: *“A Study of Ion and Electron Responses to DC Electric Fields in a Premixed Methane-Air Flame”*

M.S. Non-Thesis Students Supervised

Wade Harlow

Fall 2012 – Spring 2014

Lindsey Blair

Summer 2014 – Spring 2015

Undergraduate Thesis Students Supervised

Katy Kolasinski

Spring 2013 – Spring 2014

Thesis Title: “*Atmospheric Plasma Analysis*”

III. SERVICE

Professional Activities

1. AIAA Plasmadynamics and Lasers Technical Committee full member, 2014-present
2. AIAA Electric Propulsion Technical Committee associate member, 2015-present
 - Chair of Continuing Education Sub-committee
3. Technical Committee service: Organize short courses
 - Plasma diagnostics as joint TC activity
 - EP fundamentals, Economics of EP for EP TC
4. Journal reviewer
 - Review of Scientific Instruments
 - Journal of Propulsion and Power
 - European Physical Journal D
 - IEEE Journal of MEMS
 - Plasma Sources, Science, and Technology
5. Conference session chair
 - AIAA JPC, 2009
 - AIAA Scitech, 2015-2016
 - AIAA Aviation, 2015
 - IEPC, 2013
6. NSF proposal panel reviewer, Combustion and Fire Program, 2015
7. AIAA book proposal reviewer for updated version of Robert Jahn’s text on Electric Propulsion, 2014
8. Editor for AIAA Greater Huntsville Section newsletter, 2014-present
9. Professional Society Memberships
 - AIAA Senior Member
 - IEEE Member
 - AVS Member

University Activities

1. Developed and run COE undergraduate research program
2. Member of MAE undergraduate curriculum committee
3. Reviewer/Judge for outreach and research programs
 - Alabama InSPIRESS program
 - ALSAMP undergraduate research competition
 - North Alabama Science Fair
 - Georgia Tech undergraduate research competition
 - Georgia Tech President's undergraduate research award
4. Mentor for UAH COE summer camp
5. Panelist for 2014 von Braun Symposium: "Space Exploration – Perspectives with the Millennial Generation"

IV. HONORS AND AWARDS

- 1st Place Communications Award, AIAA Section Awards for Greater Huntsville Section.
- NDSEG Fellow, provided funding for 3 years of graduate school, 2007.
- Georgia Tech Institute Fellow, Georgia Institute of Technology, provided funding on top of existing scholarships for 4 years, 2006.
- Boeing Fellow, Boeing Corporation, one time tuition award, 2002