Lulin Jiang

Tenure-Track Assistant Professor
Department of Mechanical Engineering
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EDUCATION AND TRAINING

Ph.D. in Mechanical Engineering, The University of Alabama, Tuscaloosa, AL 2014
Dissertation: "Investigation of Atomization Mechanisms and Flame Structure of a Twin-Fluid Injector for Different Liquid Fuels"
Advisor: Ajay K. Agrawal (past Chair of US Sections of the Combustion Institute (USSCI))
co-Advisor: Robert P. Taylor *(past Department Head of ME at The U of Alabama)*

M.S. in Mechanical Engineering, The University of Alabama, Tuscaloosa, AL 2013

Princeton-CEFRC Summer School on Combustion, Princeton University, Princeton, NJ 2012 & 2013

Juris Master (J.M.) in Law, Huazhong University of Science and Technology, Wuhan, Hubei, China 2009
Areas of Concentration: Energy and Environmental Law, Intellectual Property Law

B.S. Honors in Thermal Energy and Power Engineering, North China Electric Power University, Baoding, Hebei, China (Dean's List) 2005

HONORS AND AWARDS

The 2018 MCHE Department Junior Faculty R&D Award, Department of Mechanical Engineering, University of Louisiana at Lafayette, Lafayette, LA 2018

Faculty Travel Grant Award, University of Louisiana at Lafayette, Lafayette, LA 2015-2018

Award of Louisiana NASA EPSCoR Research Awards Program (RAP), LaSPACE / LA NASA EPSCoR 2017

Travel Grant to SWE's Academic Leadership for Women in Engineering, Society of Women Engineers and NSF ASSIST 2017

Certificate of Achievement in Innovation 2014-2016, University of Louisiana at Lafayette, Lafayette, LA 2016

Transportation Innovation for Research Exploration (TIRE) Awards Fiscal Year 2017, Louisiana Transportation Research Center 2016

Graduate Student Research and Travel Support Award, Graduate School, The University of Alabama, Tuscaloosa, AL 2012 - 2014

Selected life-time member of Alpha Epsilon Lamda (AEL), US National Honor Society of Graduate and Professional School Students Since 2013

Outstanding Graduate Award, Education Department, Hebei Province, China 2005

Outstanding Graduate Award, North China Electric Power University, Baoding, Hebei Province, China 2005

Honor of Merit Student Award with Scholarship, North China Electric Power University, Baoding, Hebei Province, China 2002 - 2005

RESEARCH INTERESTS

- Design of Thermal-Fluid Systems
- Next-generation Combustion and Propulsion
- Alternative Energy
- Advanced Atomization and Sprays
- Investigation of fluid mechanics using cutting-edge Laser Diagnostics
- Bio-printing using novel two-phase spraying

RESEARCH EXPERIENCE

Tenure-Track Assistant Professor 2019 -
Department of Mechanical Engineering, Baylor Universit

Tenure-Track Assistant Professor 2015 - 2019
Department of Mechanical Engineering, University of Louisiana at Lafayette

- *Establishment of the Cornerstone Combustion and Flow Diagnostics lab from scratch*
- *Establishment of the Combustion and Atomization research program with funded projects and external connection*
  - *A diverse group of doctoral, master and undergraduate students including high-caliber personnel from minority and underrepresented groups*
  - *Technical advisors from NASA Glenn and Parker Hannifin*
- *Design of Thermo-Fluid Systems*
  - *Invention of novel fuel injectors for both continuous flow and pulse-mode applications (such as jet engines and IC engines respectively)*
  - *Design of a swirl-stabilized gas turbine burner with high fuel flexibility*
  - *Design of high-pressure chamber with optical accessibility for atomization and combustion at engine-relevant conditions*
- *Research on near-zero-emission combustion for developing next-gen engines*
- *Experimental flow investigation using highly resolved laser diagnostics such as Particle Imaging Velocimetry (PIV)*

Visiting Assistant Professor 2014 – 2015
Department of Mechanical Engineering, University of Louisiana at Lafayette

- *Design of a self-sustaining torrefaction system.*
- *Energy conversion*

Graduate Research Assistant 2010 - 2014
Department of Mechanical Engineering, The University of Alabama

- *Helped develop the fuel-flexible flow blurring (FB) fuel injector.*
- *Designed a lab scale dual-fuel combustion system.*
- *Designed a helium-cooled emission probe.*
- *Developed an experimental set-up with a DAQ system for flow experimentation.*
- *Wrote a Lab View code for instrumentation controlling and data logging.*
- *Combusted both conventional and alternative fuels with ultra-low emissions.*
- *Designed and conducted experiments to investigate FB atomization mechanism.*
- *Used laser diagnostics (high-speed PIV) to measure flow fields.*
- *Analyzed results, wrote technical articles and conducted conference presentations.*
- *Trained new research colleagues about lab policies and instrumentation utilization.*

RESEARCH FUNDING SUPPORT

PI (100%), 06/01/18-06/30/21, Understanding Spray and Combustion Characteristics of a Novel Fuel-Flexible Twin-Fluid Injector, *LA BoR- Research Competitiveness Subprogram (RCS), $225,712. (Rank: # 1 among the 151 applications). Technical Advisor: Dr. Adel Mansour in Gas Turbine Fuel Systems Division of Parker Hannifin Corporation. (Terminated due to Relocation to Baylor)*

PI (100%), 01/15/18-06/30/19, Investigation of the Primary Atomization of a Novel Lean-Direct Injection Nozzle for Near-Zero-Emission Aviation, *LA BoR-NASA EPSCoR Research Award Program (RAP), Contract No. LEQSF-EPS(2017)-RAP-24, $79,568. (One of the three awarded projects). Technical Advisor: Dr. Kathleen Tacina in Engine Combustion Branch of NASA Glenn.*

PI (100%), 2016, Design and Investigation of Fuel-Flexible Injection System, *funded by Louisiana Transportation Research Center – Transportation Innovation for Research Exploration (TIRE), Baton Rouge, LA, $29,990. (One of the three awarded projects)*

Graduate Research Assistant, 2010 to 2014, Low Emissions Burner Technology for Metal Processing Industry using Byproducts and Biomass Derived Liquid Fuels, *funded by U.S. Department of Energy (DOE) (Award Number: EE0001733).*

REFEREED PUBLICATIONS/TO BE SUBMITTED (**"*"** denotes the corresponding author)

1. Jiang D., **Jiang**, **L.** and Ling, Y., 2019, "Numerical Investigation of Internal Flow in Flow-Blurring atomizers." *ASME - JSME - KSME Joint Fluids Engineering Conference 2019, July 28 – Aug 1, San Francisco, CA. Paper No. AJKFLUIDS2019-5767.*
2. Danh, V.T., Akinyemi, O. S., Taylor, C.E., Frank, J. T. and **Jiang, L**.*, "Effect of Injector Swirl Number on Near-Field Spray Characteristics of a Novel Twin-Fluid Injector." *Experiments in Fluids,* 60:80 (2019), https://doi.org/10.1007/s00348-019-2721-6.
3. Akinyemi, O. S., and **Jiang, L**.*, "Development and Combustion Characterization of a Novel Twin-Fluid Fuel Injector in a Swirl-Stabilized Gas Turbine Burner Operating on Straight Vegetable Oil." *Experimental Thermal and Fluid Science,* 102 (2019), pp. 279-290.
4. Akinyemi, O. S. and **Jiang, L**.*, Hernandez, R., McIntyre, C., and Holmes, W. "Combustion of Straight Algae Oil in a Swirl-Stabilized Burner Using a Novel Twin-Fluid Injector." *Fuel,* 241 (2019), pp. 176-187.
5. Danh, V.T., **Jiang, L**.* and Akinyemi, O. S., "Investigation of Water Spray Characteristics in the Near Field of a Novel Swirl Burst Injector." *Experimental Thermal and Fluid Science,* 102 (2019), pp. 376-386**.**
6. Akinyemi, O.S., **Jiang**, **L.*,** Barkov, S.O, Buchireddy, P.R., Guillory, J.L., and Holmes, W., "Investigation of Effect of Biomass Torrefaction Temperature on Volatile Energy Recovery Through Combustion*." Journal of Energy Resources Technology* 140(11):112003 (2018), DOI: 10.1115/1.4040202.
7. Akinyemi, O.S., **Jiang**, **L.*,** Barkov, S.O, Buchireddy, P.R., Guillory, J.L., and Holmes, W., "Effect of Thermal Treatment Temperature of a Pine-Wood-Chips-Fed Torrefaction System on Energy Recovery through Combustion of Volatiles." *Proceedings of ASME Turbo Expo 2017*: Turbine Technical Conference and Exposition, Charlotte, North Carolina, USA, ASME Paper GT2017-64941.
8. Liu L., Liu Y., Mi M., Wang Z., and **Jiang, L.**, "Evaporation of a Bicomponent Droplet during Depressurization." *International Journal of Heat and Mass Transfer*, 100 (2016), pp. 615-626.
9. **Jiang, L.** and Agrawal, A.K., "Spray features in the near field of a flow-blurring injector investigated by high-speed visualization and time-resolved PIV." *Experiments in Fluids*, 56(103) (2015), DOI: 10.1007/s00348-015-1973-z.
10. **Jiang, L.** and Agrawal, A.K., "Investigation of glycerol atomization in the near-field of a flow-blurring injector using time-resolved PIV and high-speed visualization." *Flow, Turbulence and Combustion*, 94(2) (2015), pp. 323-338.
11. **Jiang, L.** and Agrawal, A.K., "Combustion of Straight Glycerol With/Without Methane Using a Fuel-Flexible, Low-Emissions Burner." *Fuel*, 136 (2014), pp. 177-184.

12. **Jiang, L.**, Agrawal, A.K., and Taylor, R.P., "Clean Combustion of Different Liquid Fuels using a Novel Injector." *Experimental Thermal and Fluid Science*, 57 (2014), pp. 275-284.
13. **Jiang, L.**, Agrawal, A.K., and Taylor, R.P., 2014, "High speed visualization and PIV measurements in the near field of spray produced by flow-blurring atomization." *Proceedings of ASME Turbo Expo 2014*: Turbine Technical Conference and Exposition, Düsseldorf, Germany, ASME Paper GT2014-27199**.**
14. **Jiang, L.**, Kolhe, P.S., Taylor, R.P., and Agrawal, A.K., 2012, "Measurements in a Combustor Operated on Alternative Liquid Fuels." *50th AIAA Aerospace Sciences Meeting Including the New Horizons Forum and Aerospace Exposition,* January 9-12, Nashville, Tennessee. *Paper No. AIAA 2012-0524.*
15. Akinyemi, O. S.**, Jiang**, **L.*** "Simultaneous Investigation of Internal Flow and Near-Field Atomization of a Novel Twin-Fluid Injector for Water Sprays." **Submitted to** *AIAA Journal*.
16. Akinyemi, O. S., Anderson, S., and **Jiang**, **L.***, *"*Global Combustion Characteristics of a Novel Twin-Fluid Injector on Various Fuels" **To be submitted to** *Combustion Science and Technology (***within one month***).*
17. Nasim, N.M., Qavi, I., Akinyemi, O. S., and **Jiang**, **L.*,** "Experimental Investigation of Atomization Mechanisms of a Flow-Blurring Injector at Various Internal Injector Geometry." **To be submitted to** *Atomization and Spray*s *(***within one month***).*

BOOK CHAPTERS

1. **Jiang, L.** and Agrawal, A.K., "Spray Diagnostics in the Near Field of a Novel Two-Phase Atomizer." In: Agarwal, A.K., Aggarwal, S.K., Gupta, A.K., Kushari, A. and Pandey, A., editors. Energy, Combustion and Propulsion: New Perspectives. pp. 419-438. ATHENA, India 2016.

OTHER CONFERENCE PUBLICATIONS

1. Nasim, N.M., Akinyemi, O. S., Qavi. I. and **Jiang**, **L.*,** "Investigation of the Effect of Varying H/D Ratios on the Near-Field Spray Characteristics of a Flow Blurring Injector", accepted by *11th U. S. National Combustion Meeting, March 24-27, 2019,* Pasadena, California. *Paper No. 71HC-0403.*
2. Akinyemi, O. S.**, Jiang**, **L.* "**Investigation of Primary Atomization Mechanism of a Novel Twin-Fluid Atomizer using High Spatial Resolution Shadowgraph ", *AIAA Science and Technology Forum and Exposition 2019,* January 7-11, San Diego, California.
3. Akinyemi, O. S.**, Jiang**, **L.*** and Bruno, J., *2018, "*Effect of Fuel Properties and Atomizing Air to Liquid Ratio on Combustion Performance of a Novel Twin-Fluid Injector", accepted by the *2018 Spring Technical Meeting of the Central States Section of the Combustion Institute,* May 20–22, Minneapolis, Minnesota. *Paper No. 44NC-0080.*
4. Danh, V.T., **Jiang**, **L.*,** Frank, J.T. and Taylor, C.E*., 2018, "*Effect of Injector Swirl Number on Spray Characteristics of a Novel Swirl-Burst Injector", accepted by the *2018 Spring Technical Meeting of the Central States Section of the Combustion Institute,* May 20–22, Minneapolis, Minnesota. *Paper No. 44DS-0083.*
5. **Jiang**, **L.*,** Akinyemi, O. S. and Danh, V.T*., 2017, "*Investigation of Combustion Characteristics of Straight Vegetable Oil for a Novel Twin-fluid Fuel Injector." *10th U. S. National Combustion Meeting,* April 23-26, Hyattsville, Maryland. *Paper No. 2HC-0490.*
2. Akinyemi, O. S., **Jiang**, **L.*,** Barkov, S. O, Buchireddy, P. R., Guillory, J. L., Holmes, W., 2016, **"**Energy Recovery through Combustion of Volatiles for a Torrefaction System Fed by Pine Wood Chips." *Spring Technical Meeting of the Central States Section of the Combustion Institute*, May 15–17, Knoxville, Tennessee.
3. **Jiang, L.** and Agrawal, A.K., 2014, "Impact of air to liquid mass ratios on the spray features in the near field of a flow-blurring atomizer." *Spring Technical Meeting of the Central States Section of the Combustion Institute*, March 16–18, Tulsa, Oklahoma.
4. **Jiang, L.**, Agrawal, A.K. and Taylor, R.P., 2013, "Alternate Fuel Combustor Operated on Glycerol and Methane." *8th U.S. National Combustion Meeting,* May 19–22, University of Utah, Salt Lake City, Utah. *Paper No. 070ST-0305.*

5. Agrawal, S. R., **Jiang, L.**, Agrawal, A.K., and Midkiff, K.C., 2013, "Analysis of Two-Phase Flow inside a Transparent Fuel Injector." *8th U. S. National Combustion Meeting*, May 19–22, University of Utah, Salt Lake City, Utah. *Paper No. 070HE-0317.*
6. **Jiang, L.**, Taylor, R.P. and Agrawal, A.K., 2012, "Emissions and Temperature Measurements in Glycerol Flames." *Spring Technical Meeting of the Central States Section of the Combustion Institute*, April 22–24, University of Dayton, Dayton, Ohio. *Paper No. 030AF-0119.*

PATENTS

Jiang, L., "Device and method for fuel injection using swirl burst injector", US patent Pub. No. US 2018/0029054_A1, Feb. 1, 2018.

TECHNICAL REPORT

1. Jiang, L., Qavi, I., Nayer, N.M. and Akinyemi, O.S., "Understanding Effect of Fuel Properties and/or Injector H/D Ratios on Spray and Combustion Characteristics of Flow-Blurring Atomization." Final report, LA Board of Regents (BoR), Aug 2019.
2. Jiang, L., Akinyemi, O.S. and Nayer, N.M., "Investigation of the Primary Atomization of a Novel Lean-Direct Injection Nozzle Using Water for Near-Zero-Emission Aviation." Final report, LA BoR-NASA EPSCoR, Aug 2019.
3. Jiang, L., Akinyemi, O.S. and Danh, V., "Design and investigation of a fuel-flexible injection system for low-emission vehicles." Final report, Louisiana Transportation Research Center, Jun 2017.

INVITED TALKS AND WORKSHOPS

1. "Advanced Atomization and Combustion Using a Novel Twin-Fluid Injector for Next-Generation Engines", Florida State University, Tallahassee, FL, Apr 2019.
2. "Atomization and Combustion Performance of a Novel Twin-Fluid Injector for Next-Generation Engines", The University of Alabama, Tuscaloosa, AL, Mar 2019.
3. "Atomization and Combustion Characteristics of a Novel Fuel-Flexible Injector for Near-Zero-Emission Aviation", the 2018 LaSPACE Fall Council Meeting, LSU Health Sciences Center, Shreveport, LA, Nov 2018.
4. "A Novel Two-Phase Flow Injection for Potential Applications in Material Science", Institute for Materials Research & Innovation (IMRI) Faculty Retreat Presentation, University of Louisiana at Lafayette, LA, Oct 2017.
5. "Investigation of Atomization and Combustion Characteristics of Novel Fuel-Flexible Injection Using Advanced Laser Diagnostics", Department of Physics, University of Louisiana at Lafayette, LA, Sep 2017.
6. The invitation-only JET Workshop - Jet fuEls and Engine (co)optimization Workshop by DOE, NASA and DoD-AFRL, NASA Glenn, Cleveland, OH, 2017.
7. "Combustion and Propulsion Research at UL Lafayette", Department of Chemical Engineering, University of Louisiana at Lafayette, LA, 2016.

TEACHING INTERESTS

- Thermodynamics
- Heat Transfer
- Fluid Mechanics
- Combustion
- Energy Systems Lab
- Alternative Energy

TEACHING TRAINING AND EXPERIENCE

Assistant Professor, Baylor University, Waco, TX 2019 -

- *Thermodynamics*
- *Introduction to Combustion*

Assistant Professor, University of Louisiana at Lafayette, Lafayette, LA 2015 - 2019
- *Graduate course MCHE 665- Advanced Heat Transfer (Evaluation: 4.5/5.0)*
- *MCHE 362 – Thermal Engineering (Evaluation: 4.8/5.0)*
- *Graduate course MCHE 578 – Combustion (Evaluation: 4.5/5.0)*
- *Developed a new session of MCHE 470 – Introduction to Combustion*

Instructor, University of Louisiana at Lafayette, Lafayette, LA 2014 - 2015
- *Taught MCHE 665- Advanced Heat Transfer (Evaluation: 4.8/5.0)*
- *Taught MCHE 469- Heat Transfer (Evaluation: 4.1/5.0)*
- *Taught MCHE 358- Energy Systems Laboratory (Evaluation: 4.7/5.0)*
- *Advised 40 undergraduates*
- *Developed graduate level MCHE 578 – Introduction to Combustion*

Graduate Assistant, The University of Alabama, Tuscaloosa, AL 2009 - 2014
- *Instructed an undergraduate to design and test a transparent FB injector with a National conference paper publication.*
- *Instructed an undergraduate from IIT (India) to design a solid atomizer for intern.*
- *Introduced and explained research projects to undergraduates in the lab.*
- *Graded assignments and supported students with individual study needs for undergraduate courses of Thermodynamics and Heat Transfer.*

International Teaching Assistant Program, The University of Alabama, Tuscaloosa, AL 2010
- *Obtained graduate teaching assistant training on Teaching Methods.*

STUDENTS ADVISED

Ph.D. Students Chaired:

1. Oladapo S. Akinyemi (In progress), "Investigation of Combustion and Primary Atomization Characteristics of a Novel Swirl-Burst Injector," Successfully defended in July 2019, UL Lafayette. (Currently: Adjunct Professor, Dept of Mechanical Engineering, UL Lafayette)
2. Imitiaz Qavi (In progress), "Characterization of Near-Field Sprays of Various Liquids for Flow-Blurring Atomization at Elevated Pressures Using Highly Resolved Shadowgraph Imaging and PIV," Expected graduation Aug 2022, Baylor University.

M.S. Students Chaired:

1. Vu Danh, "Investigation of Near-Field Spray Characteristics of Two Novel Twin-Fluid Atomizers," Aug 2018, UL Lafayette (Currently: Associate Engineer-Completion Tools, Superior Energy Services, Houston, TX). *Winner of The VerTech Green City Student Design Competition of 2017 LAGCOE with the 2nd place award.*
2. Prashanth Kumar Yeddula, "CFD Modeling of the Internal Flow Characteristics of a Flow-Blurring Injector", Dec 2018, UL Lafayette.
3. Nayeer Nasim (In progress), "Effect of Fuel Properties on Combustion and Spray Characteristics at Atmospheric Pressure for a Novel Twin-Fluid Injector," Expected graduation Aug 2020, UL Lafayette.

Undergraduate Students Advised:

Undergraduate Research Assistants with project topics/tasks:

1. John T. Frank, "Micro-machining of injector heads for dual-phase blurring applications," Aug 2016 till May 2018, UL Lafayette. Presented at 2018 STEM Conference at Lamar Univerisity.

2. Noah P. Deshotels, "High-precision micro machining of transparent injectors for internal-flow visualization," since Jan 2018, UL Lafayette.
3. Samuel Anderson, "Design of a twin-fluid sprayer for bio-printing using hydrogel," since May 2018, UL Lafayette.
4. Benjamin Bernard, "Design of pulsation dampeners for steady flows," Fall 2017, UL Lafayette.
5. Vu Danh , "Fuel injector and swirler design for lab-scale fuel-flexible combustor," Fa 2015 to Spring 2016, UL Lafayette.
6. Emily Faulk, "Understanding and design of data acquisition program for flow measurements using Labview," since Fall 2016.
7. Bailey Guidry, "Understanding of flow blurring atomization," since Spring 2018
8. Jacob A Bruno, assisted with "Combustion of various fuels in a swirl-stabilized lab burner using a novel swirl burst injector," Spring 2018.

Undergraduate Senior Projects:

1. Shane Bankston and Gideon Njoku, "Integration of fine flow blurring atomization into a fuel nozzle for C60 Capstone Microturbine", Dec 2018, UL Lafayette.
2. Chaz Russo, Joshua Fontenot, J. Chance Harbour and Michael Shute, "Modification of an Industrial Gasoline Direct Injection Injector Using a Two-Phase Flow Concept," Dec 2017, UL Lafayette.
3. Hayden LeJeune, Matt Benoit, Jacob Broussard and Brennan Landry, "Design of a Pulse-mode Fuel Injector using Flow-Blurring Atomization Concept," Dec 2016, UL Lafayette.
4. Vu T Danh, Heath Headley, Tommy Harris, Nicholas Chua and Ryan Fontenot, "Investigation of spray flow pattern of a 3D-printed flow-blurring injector," May 2016, UL Lafayette.

Undergraduate Independent Study:

1. Ronald Kisor and Jace Delcambre, "Modification design and internal flow simulation of a fuel injector of Capstone C60 microturbine", Dec 2018, UL Lafayette.

SERVICES

- Member of Dean Search Committee, College of Engineering, University of Louisiana at Lafayette, since 2018.
- Invited proposal reviewer for Environmental Research & Education Foundation (EREF), 2018
- Invited National Science Foundation (NSF) Panelist, 2018.
- National Level One-on-One Mentor of Society of Women Engineers (SWE), 2017.
- Member of *Committee on Graduate Faculty Membership*, University of Louisiana at Lafayette, Since 2016.
- Ex-officio, College Peer Review Committee, College of Engineering, University of Louisiana at Lafayette, 2016.
- Session Chair for the session *Droplets/Spray II at the 10th U.S. National Combustion Meeting,* College Park, MD, 2017.
- Member of Faculty Search Committee, Department of Mechanical Engineering, University of Louisiana at Lafayette, 2016.
- Session Chair for the session *Fuels and Emissions 1* at *the 2016 Technical Meeting of the Central States section of the Combustion Institute*, Knoxville, TN, 2016.
- Level 2 Graduate Faculty for doctoral & master students, University of Louisiana at Lafayette, since 2015
- Coordinator of International Graduate Exchange Program in Mechanical Engineering at University of Louisiana at Lafayette, 2015.
- Invited Article Reviewer of ASME Turbo-Expo (invited), ASME-FEDSM, Interfacial Phenomena and Heat Transfer, Journal of Cleaner Production, Journal of Engineering for Gas Turbines and Power, International Journal of Multiphase Flow, and Progress in Energy and Combustion Science.

SKILLS

Software: Matlab, Labview, Autocad, Solidworks, Chemkin-Pro, Insight 4G, FlowSizer, ANSYS FLUENT (CFD), Tecplot, and Microsoft Office.

Experiment Skills: Installation, Manipulation and Troubleshooting of Instrumentation, measurement hardware and High Speed Imaging Technique, Laser Diagnostics.

PROFESSIONAL AFFILIATIONS

AIAA Combustion Institute Society of Women Engineers (SWE) ASME The Order of The Engineer