Venkata Krisshna | Pydakula Narayanan

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linkedin.com/in/vkpn | Date of Birth: August 21 1995 | Citizenship: India

I am a PhD candidate in Mechanical Engineering currently working in the Fluids and Computations Laboratory at Montana State University - Bozeman. I develop numerical methods in fluid dynamics to simulate multiphase flows of electrically charged liquid jets. I have experience in using discrete element method to simulate and understand the automotive battery electrode manufacturing processes. I'm interested in utilizing computational resources to further the understanding of complex applications of multi-physics processes using appropriate numerical models. I find great value in communicating the stunning display of science and nature around us. In my free time, you might join me at camp in a national park, help me land a cutthroat trout or watch me painting abstract science art.

Education

- **Montana State University - Bozeman** — **Bozeman, MT, USA**
  Doctor of Philosophy, Mechanical Engineering, 3.85/4 GPA — *2019–present*
- **Montana State University - Bozeman** — **Bozeman, MT, USA**
  Master of Science, Mechanical Engineering — *2017–2019*
- **National Institute of Technology - Trichy** — **Trichy, TN, India**
  Bachelor of Technology, Mechanical Engineering — *2013–2017*

Notable Projects

- **PhD Project (Ongoing):** *'High-Fidelity Simulation of a Rotary Bell Atomizer with Electrohydrodynamic Effects'*

  This project involves conducting research on atomization in rotary bell atomizers (RBA) which are used as paint applicators in the automotive industry. I simulate primary and secondary atomization in RBAs with high performance computing using a 3D numerical model containing a high-fidelity volume-of-fluid transport scheme and an electrohydrodynamic (EHD) formulation. Further, I analyze the effect of EHD on the physical processes of ligament formation and breakup. This project is funded and supervised by **Ford Motor Company**. I conduct research with guidance from my doctoral advisor and supervisors. Additionally, I am responsible for a monthly presentation report with my supervisors detailing the status of the project. For more details, please find the articles published on this work listed in the 'Refereed Conference Papers' section.

- **Undergraduate Research Thesis:** *'Experimental Study of The Stability of Non- Premixed Biogas Flames in the Presence of Bluff Bodies'*

  This experimental project conducted during my undergraduate senior year was a study of the stability of bio-gas flames downstream of three different types of bluff bodies for different air and fuel flow rates. Bio-gas is a synthetic fuel derived from cow dung type of animal waste. In this work, I gained exposure to the workflow of experimental fluid dynamics and energy transfer. I worked with a team of skilled researchers to set up the apparatus correctly, record data and post process the information to produce a set of results that can help increase efficiency of bio-gas powered equipment. The project was guided by **Dr. M Udayakumar**, (Natl.

Inst. of Tech. - Trichy) and experimentally supported by **Dr. V Raghavan**, (Indian Inst. of Tech. - Madras)

Work Experience

- **Fluids and Computations Laboratory** — **MSU-Bozeman, MT, USA**
  Research Assistant — *June 2019 – present*

  I conduct research on several applications of fluid dynamics with guidance from my doctoral advisor **Dr. Mark Owkes**. I work with a team of skilled researchers to study and address potential improvements in engineering applications of fluid dynamics and identify new problem statements to tackle. Additionally, I am responsible for periodic presentation reports summarizing my research findings and discussing scientific articles that can provide new ideas for research. My time-management, science communication skills and efficiency of my workflow is appreciated by my supervisors.

- **Ford Motor Company** — **Dearborn, MI, USA**
  Summer Intern (Remote) — *May 2022 – August 2022*

  I conducted numerical simulations of the battery electrode calendering process using a discrete element method (DEM) approach in order to understand microstructural evolution during electrode manufacturing. Simulations were conducted on LIGGGHTS which is an open source DEM particle simulation software. The internship experience greatly helped me develop technical skills outside of my PhD research area, providing me more tools to solve a wider range of engineering problems.

- **Gulf Spic General Trading and Contracting Company WLL** — **Fahaheel, Kuwait**
  Engineering and Planning Intern — *May 2016 – July 2016*

  During this industrial internship, I gained exposure to the operations in an engineering and management firm including the manufacturing processes performed in contract with petroleum refineries. I provided my technical services in engineering design and was part of the quality control team investigating welding of steel pipe sections.

Teaching Experience

- **Montana State University, Mr. James Black** — **MSU-Bozeman, MT, USA**
  Teaching Assistant for Instrumentation and Control Laboratory (EMEC 360) — *January 2018 – May 2019*

  I was a laboratory technician, teaching assistant and grader to the undergraduate course that trains students how to use appropriate instrumentation equipment in mechanical and mechatronic applications. I was responsible for testing the measurement devices, assisting students during their learning process, grading their submitted work and keeping the laboratory organized and tidy.

- **Montana State University, Dr. Ruhul Amin** — **MSU-Bozeman, MT, USA**
  Teaching Assistant for Fundamentals of Heat Transfer (EMEC 326) — *January 2018 – December 2018*

  I was an instructor, teaching assistant and grader to the undergraduate course on the fundamentals of heat transfer. I was responsible for teaching several sessions of the course when the primary instructor was unavailable, assisting students during their learning process and grading their submitted work.

Non Technical Experience

- **Montana State University, Dr. Mark Owkes** — **MSU-Bozeman, MT**
  Grader for Computational Fluids Dynamics course (EMEC 436-536) — *September 2019 – present*

  I work as a student grader for the undergraduate and graduate computational fluid dynamics course. This experience allows me to revisit the fundamentals of fluid dynamics and numerical modeling while continuing to conduct research towards my PhD.

- **The MSU Exponent Student Newspaper, Ms. Audrey Moss** — **MSU-Bozeman, MT**
  Graphic Designer — *Jan 2018 – May 2018*

  The MSU Exponent has been the university's newspaper since 1895. I took up this opportunity to exercise my creative passion. I was part of a team of graphic designers and editors who were all majoring in graphic design. Despite being the only engineering student in the team, I was appreciated for my creative skills, visually appealing infographic designs and work ethics. I enjoyed channeling my creative passion in a way that can benefit the entire university community.

- **Gaines Hall Chemistry Laboratory, Ms. Shadmani Amin** — **MSU-Bozeman, MT**
  Laboratory Stockroom Manager — *October 2017 – December 2017*

  As manager of the stockroom, I was tasked with maintaining and organizing dozens of tall shelves containing apparatus, chemical reagents, tools, devices and accessories. Additionally, I had to prepare chemical solutions of appropriate concentrations for students' experiments. I was also tasked with managing the check-out process for various items in the stockroom to the lab assistants. This experience enhanced my time-management skills.

Refereed Conference Papers

- **V. Krisshna**, and M. Owkes. *High-Fidelity Simulation of a Rotary Bell Atomizer with Electrohydrodynamic Effects.* ILASS-Americas 32nd Annual Conference on Liquid Atomization and Spray Systems, Madison, WI. (2022)
- **V. Krisshna**, and M. Owkes. *High-Fidelity Simulation of a Rotary Bell Atomizer with Electrohydrodynamic Effects.* ICLASS 15th Triennial International Conference on Liquid Atomization and Spray Systems, Edinburgh, Scotland. (2021)
- **V. Krisshna**, and M. Owkes. *High-fidelity simulations of electrolyte jets in an electric field.* ICLASS 15th Triennial International Conference on Liquid Atomization and Spray Systems, Edinburgh, Scotland. (2021)
- **V. Krisshna**, and M. Owkes. *High-Fidelity Simulation of a Rotary Bell Atomizer with Electrohydrodynamic Effects.* ILASS-Americas 31st Annual Conference on Liquid Atomization and Spray Systems - Virtual (2021)

Conference Presentations and Other Participation

- **V. Krisshna**, and M. Owkes. *High-Fidelity Simulation of a Rotary Bell Atomizer with Electrohydrodynamic Effects.* 75th Annual Meeting of the APS Division of Fluid Dynamics (APS/DFD), Indianapolis, IN. (2022)
- **V. Krisshna.** *Communicating science using creative abstract interpretations of common fluid phenomena.* 75th Annual Meeting of the APS Division of Fluid Dynamics (APS/DFD), Indianapolis, IN. (2022)
- **V. Krisshna**, and M. Owkes. *High-Fidelity Simulation of a Rotary Bell Atomizer with Electrohydrodynamic Effects.* 74th Annual Meeting of the APS Division of Fluid Dynamics (APS/DFD), Phoenix, AZ. (2021)
- **V. Krisshna**, and M. Owkes. *High-Fidelity Simulation of a Rotary Bell Atomizer with Electrohydrodynamic Effects.* 73rd Annual Meeting of the APS Division of Fluid Dynamics (APS/DFD), Chicago, IL. (2020)
- **V. Krisshna**, and M. Owkes. *High-Fidelity Simulation of a Rotary Bell Atomizer with Electrohydrodynamic Effects.* 72nd Annual Meeting of the APS Division of Fluid Dynamics (APS/DFD), Seattle, WA. (2019)
- **V. Krisshna**, and M. Owkes. *High-Fidelity Simulation of a Rotary Bell Atomizer with Electrohydrodynamic Effects.* ILASS-Americas 30th Annual Conference on Liquid Atomization and Spray Systems, Tempe, AZ. (2019) - Poster Presentation

Leadership Experience

- **Organizer** — **Bozeman, MT, USA**
  Science Art Project, Montana State University — *2022 – 2023*
  The Science Art Project is aimed at communicating science by bridging it with the field of art. It helps researchers use artistic skills to articulate their research to the public community outside of technical papers. As an organizer, I am involved in speaking with researchers about potential to better communicate their science. Additionally, I help with planning the exhibition venues and proceedings.

- **Social Media Manager** — **Bozeman, MT, USA**
  Indian Student Association, Montana State University — *2022 – 2023*
  The Indian Student Association is a cultural club at Montana State University aimed at sharing the culture and diversity in India by hosting events and performances for the Bozeman community. As the social media manager, I was involved in creating and sharing content weekly on Instagram, Facebook, Whatsapp Messenger and via e-mail. I gained experience with publicity skills and quality content creation in textual, pictorial or film format.

- **President** — **Bozeman, MT, USA**
  Indian Student Association, Montana State University — *2019 – 2021*
  I was elected president of the cultural club and was responsible for directing and organizing events, managing all activities of the club, holding regular meetings to discuss club development, bringing the Indian student community together during festivals and maintaining a healthy relationship with the university administration. I worked closely with my committee to progress towards the club's goals.

- **Treasurer** — **Bozeman, MT, USA**
  Indian Student Association, Montana State University — *2017 – 2018*
  I was responsible for maintaining records of all financial and administrative matters. I was in charge of drafting a budget and presenting it to the university administration. I audited receipts and reimbursements accurately. I worked closely with the president to best accommodate their goals and to propose potential ideas for development.

- **President** — **Trichy, TN, India**
  Pixebug Photography and Videography, Natl. Inst. of Tech. - Trichy — *2016 – 2017*
  I was responsible for directing, managing and recruiting all activities of the photography and videography club during the senior year in my undergrad. I worked closely with the treasurer to make decisions on financial and administrative matters and with the vice-president and secretary to make decisions on matters relating members and events. I was appreciated for my professionalism, bringing a new structure and hierarchy into the committee and for encouraging members to involve themselves in more creative expressions such as astrophotography, travel videography and promo shoots.

- **Captain** — **Jleeb Al Shyoukh, Kuwait**
  Varsity Table Tennis Team, Indian Educational School — *2012 – 2013*
  I was responsible for effectively managing a team of four players when traveling for tournaments and attending practice. I provided assistance with communications between the school administration, coaches and the players.

Technical and Personal skills

- **Programming languages:** Proficient in: Fortran, MATLAB, Python, LaTeX; Basic ability with: C, C++
- **Scientific software skills:** Advanced: MATLAB, LIGGGHTS, LAMMPS; Beginner: ANSYS, Star-CCM+, ParaView

- **Other software:** Adobe Creative Suite (Photoshop, Lightroom, Premiere Pro, Audition)
- **Other soft skills:**
  - Presentation and science communication skills developed through outreach activities and volunteer efforts.
  - Leadership, management and public speaking skills accrued through various positions of responsibility, including as the president of Pixelbug and the president of Indian Student Association.
  - Writing and time management skills.
- **Creative skills:** Graphic design, astrophotography, travel videography, painting, dancing, woodworking
- **Spoken languages:** Proficient in: English, Tamil; Intermediate in: Hindi, Telugu

Scholastic Achievements

Recipient of Robert E. & Julia C. Noble Family Engineering scholarship
Montana State University *2018 – 2019*

I was awarded a $2000 scholarship for the duration of two semesters for my outstanding academic status, conduct and potential to succeed in my research endeavors.

Professional Scientific Societies

- American Physical Society (APS), member
- Institute for Liquid Atomization and Spray Systems (ILASS), member

Science Outreach

- **Science Art Project** **Bozeman, MT, USA**
  Artist and Science Communicator *2021, 2022*

  As a semi-professional painter, I am involved in science communication through art with the annual Science Art Project. I paint abstract interpretations of common fluid phenomena to better communicate the science around us. My paintings have been exhibited in the Bozeman Public Library and the Montana Science Center, Bozeman, MT.

- **MSU Science Explore Camp** **MSU-Bozeman, MT, USA**
  Volunteer - Scientific Demonstrator *2019, 2021*

  I am an active volunteer working towards teaching science using basic fluid dynamics to middle school children of Bozeman. I set up demonstrations and experiments (such as the cartesian diver, density layers in a straw and everyone's favorite oobleck) to explain various physical properties and phenomena in fluid dynamics.

- **MSU Family Science Day** **MSU-Bozeman, MT, USA**
  Volunteer - Scientific Demonstrator *2019, 2020*

  I am an active volunteer working on demonstrating interesting day-to-day applications of fluid dynamics to the community of Bozeman. Residents of all ages are keen to watch my demonstrations and experiments such as the liquid hourglass, surface tension powered boats and oobleck to learn the science behind everyday fluid dynamics.

- **Montana Science Center** **Bozeman, MT, USA**
  Volunteer - Technician *May 2019*

  I volunteered to build several different arduino circuit kits for young middle school students in Bozeman. I was able to implement my ideas and make the builds interactive for an enhanced learning experience.

Areas of Interest

- Incompressible multiphase flows using computer simulations.
- Electrohydrodynamics and such culminations of multiple physical phenomena that create complex flows.
- Discrete element method simulations to solve engineering problems.
- High performance computing to solve some of the most popular yet unanswered questions in science.
- Numerical modeling of physical phenomena that can be described using differential equations.
- Communicating science to learners of all ages using scientific demonstrations and appealing visuals.

Co-curricular Activities and Hobbies

- Hiking and camping - I enjoy camping in National Parks and hiking to alpine lakes in the Northern Rockies.
- Fishing - It has taught me patience - a useful virtue in my PhD research.
- Woodworking - I am self taught and have built a camping rig for my car and a greenhouse for my plants.
- Painting - I paint acrylic on canvas, usually depicting abstract interpretations of scientific phenomena.
- Photography and filmmaking - I specialize in astrophotography, short films and travel videography.
- Graphic design - It is an interest that I have occasionally been able to turn into a secondary profession.

Pictures and videos of my personal interests can be found on my website - https://www.venkatakrisshna.com

References

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