

SUMMARY

Accomplished researcher with 6+ years of expertise in mechanical and aerospace engineering principles and concepts. My background in experimental research has given me strong analytical and problem-solving skills. I am keen on leveraging this knowledge towards performing cutting-edge research in the area of aero/fluid dynamics.

EDUCATION

Ph.D. in Mechanical Engineering University of Washington, Seattle, WA <i>Thesis: Electrohydrodynamic Actuators for Propulsion and Control</i> <i>Committee: Dr. Igor Novosselov (Adv.), Prof. Alexander Mamishev, Prof. Alberto Aliseda, Prof. Dana Dabiri, Dr. Sawyer Fuller</i>	Sep 2016 – Jun 2021
Master of Science in Applied Mathematics University of Washington, Seattle, WA	Sep 2017 – Dec 2020
Master of Science in Mechanical Engineering University of Washington, Seattle, WA	Sep 2015 – Jun 2017
Bachelor of Technology in Mechanical Engineering National Institute of Technology, Warangal, India	Jul 2009 – May 2013

RESEARCH EXPERIENCE

Research Assistant, Mechanical Engineering, University of Washington Seattle WA Project focus: Electrohydrodynamic Actuators for Aerial Vehicle Control and Propulsion Collaboration with <i>Aerojet Rocketdyne</i> Developed a new plasma actuator and conducted laboratory tests to explore the forces induced by the plasma actuation in both quiescent and uniform flow environments. Set up a high-resolution glass pitot tube system and force balance system to measure plasma wall jet velocity profiles and forces. Installed the new plasma actuator on a NACA 0012 airfoil to measure the aerodynamic effect of plasma actuation using a subsonic wind tunnel. Formulated analytical and empirical models to predict the charge density and thrust (momentum injection) induced by plasma actuation.	Oct 2017 – Present
Project focus: Insect Scale Plasma Thruster Collaborated with Dr. Sawyer Fuller to work on the development of a centimeter-scale aerial robot based on electrohydrodynamic propulsion that requires no moving parts. Defined the aerial robot design requirements, and have been an integral part of developing and testing the robot.	Jan 2018 – Mar 2020
Project focus : Particle Dynamics in Electrohydrodynamic Flow Experimentally studied the transport of nanoparticles in Electrohydrodynamic flow with ionic wind as primary aspirating mechanism. Developed a new personal exposure monitor for collecting ultrafine particles which enables an in-situ analysis of pollutants using solid-state fluorescence spectroscopy.	Sep 2015 – Jan 2018
Research Student, National Institute of Technology Warangal, INDIA Project focus: Conjugate Convection with Surface Radiation from an Open Cavity Studied the effect of multimode heat transfer from a rectangular cavity equipped with non-identical flush mounted discrete heat sources. Determined how the thermal behavior of the cavity can be transformed through control of any single independent governing parameter by conducting various parametric studies.	Dec 2011 – May 2013
Undergraduate Thesis, National Institute of Technology Warangal, INDIA Project focus: Design and Development of Ornithopter Conducted design studies for flapping mechanisms and focused on understanding the aerodynamics of flapping wing birds for integrating the flapping mechanism into a physical model.	July 2012 – May 2013

PUBLICATIONS

1. A. Tang¹, **R.S. Vaddi**¹, A. Mamishev, and I. Novosselov, Empirical relations for discharge current and momentum injection in dielectric barrier discharge plasma actuators, *Journal of Physics D: Applied Physics* 54 (2021) 54: 245204
2. P. Fillingham, **R.S. Vaddi**, A. Bruning, G. Israel, and I. Novosselov, Drag, lift, and torque on a prolate spheroid resting on a smooth surface in a linear shear flow, *Powder Technology* 377 (2021) 958:965
3. U.N. Lee¹, T.L. Neel¹, F.Y. Lim, J.W. Khor, J. He, **R.S. Vaddi**, A.Q.W. Ong, A. Tang, J. Berthier, J.S. Meschke, I. Novosselov, A.B. Theberge, and E. Berthier, Miniaturizing Wet Scrubbers for Aerosolized Droplet Capture, *Analytical Chemistry* (2021) doi: 10.1021/acs.analchem.1c01296.
4. **R.S. Vaddi**, Y. Guan, A. Mamishev, and I. Novosselov, Analytical model for electrohydrodynamic thrust, *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences* (2020) 476:20200220
5. **R.S. Vaddi**, Y. Guan, and I. Novosselov, Behavior of ultrafine particles in electro-hydrodynamic flow induced by corona discharge, *Journal of Aerosol Science* (2020): 105587
6. HK. Hari Prasad¹, **R.S. Vaddi**¹, Y.M. Chukewad, E. Dedic, I. Novosselov, and S. Fuller, A laser-microfabricated electrohydrodynamic thruster for centimeter-scale aerial robots, *PLoS ONE* 15(4):e0231362
7. Y. Guan, **R.S. Vaddi**, A. Aliseda, and I. Novosselov, Analytical model of electro-hydrodynamic flow in corona discharge, *Physics of Plasmas* 25, no. 8 (2018): 083507
8. Y. Guan, **R.S. Vaddi**, A. Aliseda, and I. Novosselov, Experimental and numerical investigation of electrohydrodynamic flow in a point-to-ring corona discharge, *Physical Review Fluids* 3, no. 4 (2018): 043701

Submitted/ In Preparation

9. **R.S. Vaddi**, A. Mamishev, and I. Novosselov, Direct current augmented dielectric barrier discharge plasma actuator: Effect of the third electrode, submitted (*Applied Physics Letters*)
10. **R.S. Vaddi**, A. Mamishev, and I. Novosselov, Direct current augmented dielectric barrier discharge plasma actuator: Effect of the electrode shape, submitted (*AIAA Journal*)
11. **R.S. Vaddi**, C. Sota, A. Mamishev, and I. Novosselov, Active flow control of NACA0012 airfoil at low angle of attack using DC augmented dielectric barrier discharge plasma actuator, submitted (*Experiments in Fluids*)

CONFERENCE PROCEEDINGS (peer-reviewed)

1. **R.S. Vaddi**, G. Mahamuni, and I. Novosselov, Development of an EHD induced wind driven personal exposure monitor and in-situ analysis for characterization of exposure, *Proceedings of XI International Symposium on Electrohydrodynamics*, St. Petersburg, Russia, 18-22 Jun, 2019
2. **R.S. Vaddi**, Y. Guan, Z. Chen, A. Mamishev, and I. Novosselov, Experimental and numerical investigation of corona discharge induced flow on a flat plate, *Proceedings of XI International Symposium on Electrohydrodynamics*, St. Petersburg, Russia, 18-22 Jun, 2019
3. Y. Guan, **R.S. Vaddi**, A. Aliseda, and I. Novosselov, Comparison of Analytical and Numerical Models for Point to Ring Electro- Hydrodynamic Flow, *Proceedings of XI International Symposium on Electrohydrodynamics*, St. Petersburg, Russia, 18-22 Jun, 2019

CONFERENCE PRESENTATIONS AND POSTERS

1. U.N. Lee, T.L. Neel, F.Y. Lim, J.W. Khor, J. He, **R.S. Vaddi**, J. Berthier, I. Novosselov, A.B. Theberge, and E. Berthier, Aerosolized microdroplets and open microfluidics for aerosol capture, *Pacificchem 2021*, Dec 16 – 21, 2021
2. U.N. Lee, T.L. Neel, F.Y. Lim, J.W. Khor, J. He, **R.S. Vaddi**, A. Ong, A. Tang, J. Berthier, J.S. Meschke, I. Novosselov, A.B. Theberge, and E. Berthier, A portable open microfluidic microdroplet-based air sampler for bioaerosol capture, *25th International conference on miniaturized systems for chemistry and life sciences*, Oct 10 – 14, 2021

¹ These authors contributed equally
Ravi Sankar Vaddi

3. U.N. Lee, T.L. Neel, F.Y. Lim, J.W. Khor, J. He, **R.S. Vaddi**, J. Berthier, I. Novosselov, A.B. Theberge, and E. Berthier, A portable wet scrubber for aerosol capture, Global Health Workshop 2021, 12 – 13 Jul 2021
4. **R.S. Vaddi** and A. Mamishev, Demonstration of low acoustic emissions control and propulsion of aerial vehicles, JCATI Symposium 2021 (*Poster*)
5. **R.S. Vaddi** and A. Mamishev, Low acoustic control and propulsion of aerial vehicles, JCATI Symposium 2020 (*Poster*)
6. **R.S. Vaddi** and I. Novosselov, Analytical model for electrohydrodynamic thrust, 72nd Annual Meeting of the APS Division of Fluid Dynamics, Nov 23 – 26, 2019
7. P. Fillingham, Y. Guan, **R. S. Vaddi**, and I. Novosselov, Numerical, experimental and analytical investigation of the planar electrohydrodynamic wall jet, 72nd Annual Meeting of the APS Division of Fluid Dynamics, Nov 23 – 26, 2019
8. **R.S. Vaddi**, G. Mahamuni, and I. Novosselov, Development of an EHD induced wind driven personal exposure monitor and in-situ analysis for characterization of exposure, 37th Annual Conference American Association for Aerosol Research, Oct 14 – 18, 2019 (*Poster*)
9. **R.S. Vaddi** and A. Mamishev, Electrohydrodynamic propulsion and control of aerial vehicles, JCATI Symposium 2019 (*Poster*)
10. **R.S. Vaddi**, Y. Guan, Z. Chen, and I. Novosselov, Experimental and numerical investigation of corona discharge induced flow on a flat plate, 71st Annual Meeting of the APS Division of Fluid Dynamics Nov 18 – 20, 2018
11. I. Novosselov, Y. Guan, **R.S. Vaddi**, and A. Aliseda, Experimental, numerical and analytical investigation of electro-hydrodynamic flow in point-to-ring corona discharge, 71st Annual Meeting of the APS Division of Fluid Dynamics, Nov 18 – 20, 2018 (*Poster*)
12. **R.S. Vaddi**, Y. Guan and I. Novosselov, A Miniature Ionic Wind Electrostatic Collector for Ultrafine Particles, 36th Annual Conference American Association for Aerosol Research, Oct 16 – 20, 2017
13. **R.S. Vaddi** and I. Novosselov, Application of Combined Particle Charging Mechanism to Computational Fluid Dynamics, 35th Annual Conference American Association for Aerosol Research, Oct 17 – 21, 2016 (*Poster*)

PATENTS

1. **R.S. Vaddi**, A. Mamishev, and I. Novosselov, Direct current augmented dielectric barrier discharge (DBD - DCA) actuator for drag reduction and control, provisional patent application no. 63/196,098
2. A. Mamishev, A. Sawyer, A. Makarevich, R. Wang, and **R.S.Vaddi**, Smart individualized near-face extended wear electrohydrodynamic respirator, provisional patent application no. 63/142,580

INVITED TALKS

1. Dielectric Barrier Discharge Actuators for Flow Control, Innovation Club, National Institute of Technology, Warangal, India, February 9, 2021
2. Behavior of Ultrafine Particles in Electro-Hydrodynamic Flow Induced by Corona Discharge, University of Washington, Nanoscience and Molecular Engineering Seminar Series, October 29, 2020

WORK EXPERIENCE

Assistant Manager, Engineering R&D, Maruti Suzuki India Limited | Gurgaon, India Jul 2013 – Jul 2015

- Managed new product development process in chassis division from concept to start of production, a timeline of 5 years
- Formulated guidelines and engineering standards for FEA simulations of various suspension components
- Optimized and prototyped a light-weight steering knuckle, resulting in 10% weight and 5% cost reduction

RESEARCH AREAS/TECHNIQUES

Aerodynamics, Active Flow Control, Electrohydrodynamics (EHD), Plasma Physics, Plasma Actuation, Boundary-Layer Stability, Experimental Methods, Drag Reduction, Separation Control, Hotwire Anemometry, Model

Development, Computational Fluid Dynamics (CFD), Finite Element Analysis (FEA), Data Science in Fluids Dynamics, Particle Charging, Electrostatic Precipitation

SKILLS

MATLAB, C, C++, ANSYS®, Fluent, Tecplot 360™, COMSOL Multiphysics, Maxwell, Design of Experiments, Python, Lab VIEW, ImageJ, Solidworks, Microsoft Office Suite

TEACHING & MENTORING ACTIVITIES

Teaching Assistant, University of Washington | Seattle WA Dec 2015 – Mar 2016 & Sep 2017 – Dec 2017
Course: Modeling of MEMS (EE 503)

- Developed a curriculum for the section on Modeling of Heat Transfer in MEMS devices for electrical engineering graduate students.
- Led students in lab sections on structural, electromagnetic, fluid, and thermal simulations of different microelectromechanical systems on COMSOL multiphysics and Ansys Maxwell.

Mentor, University of Washington | Seattle WA Mar 2016 – Present

- Mentoring undergraduate and graduate students on various independent research projects.

Jiaying Fu	BS	Pursing MS (ME) at Columbia University	Oct 2019 – Jun 2021
Chase Dietner	BS	Intern at SpaceX	Sep 2019 – Jun 2021
Anthony Tang	BS	PhD student at University of Washington	Sep 2018 – Jun 2020
Jan Niklas Knuefer	MS	Pursuing MS (CS)	Apr 2019 – Apr 2020
Bac Tran	BS	Electrical Engineer at Elmore Electric	Sep 2018 – Dec 2019
Zhi yan Chen	MS	Engineer in Training (Vancouver, CA)	Jun 2018 – Dec 2019
Andrew Gaard	BS	Mechanical engineer at Pure Watercraft	Jun 2017 – Sep 2018
Lizzy Lee	BS	Mechanical engineer at Microsoft	Mar 2016 – Jun 2017
Nick Christoforou	BS	CAE engineer at General Motors	Mar 2016 – Jun 2017

- Supervised 2 senior year capstone projects.

Mentor, Innovation Club, National Institute of Technology | Warangal Mar 2021 – Present
Mentoring 4 undergraduate students on 2 different research projects. Held discussions to encourage students to explore different research opportunities.

Tutor, Online Jun 2020 – Present
Instructed mathematics and physics to high school students to engage in science and learning. Developed lesson plans and homework assignments for each subject.

GRANTS & AWARDS

The Joint Center for Aerospace Technology Innovation Funding	2018 – 2021
American Association of Aerosol Research Travel Grant	2017
College of Engineering Graduate Student Conference Travel Grant, University of Washington	2016, 2018
Employee Achievement Award for Outstanding Work – Maruti Suzuki India Limited	2015

PRESS

An itty-bitty robot that lifts off like a sci-fi spaceship Wired magazine article	Jul 2019
Team Sparks and Shocks - 2019 Alaska Airlines Environmental Innovation Challenge	Apr 2019

PROFESSIONAL DEVELOPMENT

Volunteer for the 72nd Annual Meeting of the American Physical Society's Division of Fluid Dynamics (3500 participants). Abstract sorting, volunteering the conference sessions	Nov 2019
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Reviewer for international peer-reviewed journals (Applied Thermal Engineering, IEEE Access, Applied Physics Letters, Journal of Electrostatics, Plasma Chemistry and Plasma Processing, 2017 – Present Journal of Fluid Mechanics, Journal of Aerosol Science)

REFERENCES

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