

Syam S.

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Education

Program	Institution/Board	Year
Ph.D (Aerospace Propulsion)	Indian Institute of Technology Kharagpur, West Bengal, India	2021
M.Tech. (Turbomachines)	National Institute of Technology Surat, Gujarat, India	2013
Bachelors (Aeronautical Engineering)	The Aeronautical Society of India, New Delhi, India	2011

Experience

Postdoctoral Scholar 06/2023 - Present
(Supervisor: Dr. Bryan E. Schmidt) Case Western Reserve University, Cleveland, Ohio, USA

- **Influence of Aerosols and Particulates on Hypersonic Boundary Layer Transition**
- **Keywords:** Hypersonic Aerodynamics, Gas Gun Range experiments, Laminar-to-turbulent Transition

Junior Research Fellow 6/2020 - 4/2023
(Supervisor: Prof. Ratan Joarder) Indian Institute of Technology Kharagpur, West Benagl, India

- **Study of Double Pulse Laser Ignition of an Atomized Fuel-Air Mixture**
- **Keywords:** Laser Ignition, Ethanol-Air Spray, Plasma Kernel Growth

Projects

Real-Time Measurement of Particulate Concentration in Laser Surgery with Jet Ventilation 2024-2025
(Justin Jou, Bryan E. Schmidt, & Scott N. Howard)

- Studied particulate generation during laser surgery under jet ventilation in real-time
- Used an optical particle sizer to measure particulates and background-oriented schlieren to visualize them
- Quantified particulate generation in laser surgery with jet ventilation

An Experimental Investigation on the Effect of Laser Energy Deposition in an Over-expanded Jet 2023-2024
(Gauresh R. Jassal & Bryan E. Schmidt)

- Investigated the effects of laser energy deposition in an over-expanded jet experimentally
- Used self-aligning schlieren to visualize the supersonic jet's response to the laser energy deposition
- Characterized the shock train dynamics and the flow structure recovery process of the jet to the energy deposition

Study of Double Pulse Laser Ignition of an Atomized Fuel-Air Mixture 2020-2023
(Sandeep Panday & Ratan Joarder)

- Studied double-pulsed laser-induced breakdown (LIB) in stagnant air
- Investigating laser-induced spark ignition of ethanol-air spray
- Examined the influence of location and pulse energy on ignition probability of the spray

Ph. D Thesis 2013-2019
(Srinibas Karmakar & Ratan Joarder)

- **An Experimental Investigation on Combustion Characteristics of Jet A-1/Ethanol Droplets and Numerical Simulation of Droplet Evaporation Using Two-Fluid Model**
- Developed an experimental setup for single droplet combustion (Jet A-1/ethanol) studies
- Developed an image processing tool in MATLAB for analyzing the high-speed droplet combustion images
- Developed a numerical code (Fortran and OpenMP) for multiphase flow analysis (Two-Fluid Model) of droplet evaporation using finite volume formulation and AUSM⁺-up scheme

- Performed parameterization of high-speed axial flow compressor airfoils (CDA) using the Bezier curve method
- Coupled Fluent software with the Genetic Algorithm toolbox (MATLAB) to Optimize the CDA airfoils
- Conducted low-speed wind tunnel experiments on the optimized CDA airfoil cascade model

- Boundary Layer Transition, Hypersonic Aerodynamics, Flow visualization and Imaging
- Droplet and Spray Combustion, Bio-fuels, Renewable Energy
- Computational Fluid Dynamics, High Performance Computing, Multiphase Flows

- Programming Language: Fortran, MATLAB, Python, OpenMP
- Design and Simulation: SolidWorks, ANSYS Gambit and Fluent, OpenFOAM, AxSTREAM
- Other tools: LabView, LaTeX, HTML, Microsoft Office (Word, Excel, PowerPoint, etc.)

- **Socail Activity Chair**, Postdoctoral Association, Case Western Reserve University (2023 – 2025)
- **Member**, Research Scholars' Representative Council, IIT Kharagpur (2017 - 2018)
- **Research Scholars' Representative**, Department of Aerospace Engineering, IIT Kharagpur (2014 - 2015)

- Secured all India rank 58th in **Graduate Aptitude Test in Engineering (GATE) 2011 in Aerospace Engineering** with a score of 555 (Percentile: 98.02)
- Recipient of the **Ministry of Human Resource Development (MHRD) (India) Fellowships** during master's (2011 - 2013) and doctoral studies (2013 - 2018)

- **Member** of American Physical Society
- **Member** of the Aeronautical Society of India
- **Member** of American Society of Mechanical Engineers

- Self-motivated and passionate about achieving goals
- A good team player and also able to work independently
- Eager to learn new concepts and technologies, and their applications
- Nationality: **India**
- Date of Birth: **05/25/1988**
- Marital Status: **Married**
- Languages: **Malayalam, Tamil, Hindi, and English**
- Hobbies: **Cooking, Gardening, Traveling, and Listening to Music**

Dr. Bryan E. Schmidt Assistant Professor, EMAE, Case Western Reserve University
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Prof. Srinibas Karmakar Associate Professor, Depart. of Aerospace Engg., IIT Kharagpur
 ○ Department of Aerospace Engineering, Indian Institute of Technology Kharagpur, West Bengal, India – 721302
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Prof. Ratan Joarder Associate Professor, Depart. of Aerospace Engg., IIT Kharagpur
 ○ Department of Aerospace Engineering, Indian Institute of Technology Kharagpur, West Bengal, India – 721302
 ○ +91 (3222) 283000, jratan@aero.iitkgp.ac.in

Patent

1. Joarder, R., Pandey, S., **Syam, S**, Kumar, A., Jain, M., Bhaktha, S. N. B., & Sinhamahapatra, K. P. (2024). *A Laser Ignition System for Aircraft Gas Turbine Combustors and Method Thereof* (Indian Patent No. 535154 & Application No. 202331056625). Indian Patent Office.

Journal Publications

1. **Syam, S**, Jou, J., Schmidt, B. E., & Howard, N. S. (2025). Real-Time Measurement of Particulate Concentration: Laser Surgery with Jet Ventilation. *Otolaryngology – Head and Neck Surgery* (Submitted).
2. Jou, J., **Syam, S**, Marouf, A., Schroeder, A. N., Howard, N. S., & Schmidt, B. E. (2025). Evaluation of aerosol-laden plumes generated by jet ventilation using background-oriented schlieren. *The Laryngoscope*, 135 (10), 3795–3803. doi:10.1002/lary.32354
3. **Syam, S**, Jassal, G. R., & Schmidt, B. E. (2025). An experimental investigation on the effect of laser energy deposition in an over-expanded jet. *Experiments in Fluids*, 66, 82. doi:10.1007/s00348-025-04008-x
4. Joarder, R., Vellala, S. L., Singh, A. P., **S. Syam**, Padhi, U. P., & Choudhury, S. P. (2021). On the radiative heat loss and axis-switching phenomena of a decaying laser spark. *Plasma Sources Science and Technology*, 30, 015011. doi:10.1088/1361-6595/abd381
5. Rao, D. C. K., **Syam, S.**, Karmakar, S., & Joarder, R. (2017). Experimental investigations on nucleation, bubble growth, and micro explosion characteristics during the combustion of ethanol/jet A-1 fuel droplets. *Experimental Thermal and Fluid Science*, 89, 284-294. doi:10.1016/j.expthermflusci.2017.08.025

Conference Proceedings

1. **Syam, S**, Brannigan, T. G., & Schmidt, B. E. (2025). Bore-rider design of cone-flair-cylinder projectiles for hypersonic boundary layer transition studies. *In the Division of Fluid Dynamics Annual Meeting 2025*. Houston, USA.
2. **Syam, S**, Jou, J., Schmidt, B. E., & Howard, N. S. (2025). Using background oriented schlieren imaging to evaluate the risk of aerosol generating procedures. *In American College of Surgeons Quality and Safety Conference 2025*. San Diego, USA.
3. **Syam, S**, Jassal, G. R., & Schmidt, B. E. (2024). An experimental investigation on the effect of laser energy deposition in an over-expanded jet. *In Proceedings of the 21st International Symposium on the Application of Laser and Imaging Techniques to Fluid Mechanics*. Lisbon, Portugal. doi:10.55037/lxaser.21st.200
4. Choudhury, S. P., **Syam, S**, & Joarder, R. (2025). Optical measurement technique for thermo-acoustic pressure detection in a combustion chamber. *In Myong, r.s., kim, h.d. (eds) Proceedings of the 34th International Symposium on Shock Waves*. Volume 2, Applications 1 (pp. 561–571): ISSW34, July 16-21 2023, Daegu, South Korea. Singapore. doi:10.1007/978-981-96-4771-2_53
5. Ananthakrishnan, A., Choudhury, S. P., **Syam, S**, & Joarder, R. (2024). Experimental study of acoustic phenomenon in a closed combustion chamber. *In: Singh, K.M., Dutta, S., Subudhi, S., Singh, N.K. (eds) Fluid Mechanics and Fluid Power*, Volume 4 (pp. 279–287). FMFP 2022. Lecture Notes in Mechanical Engineering. doi:10.1007/978-981-99-7177-0_23
6. Choudhury, S. P., Joarder, R., & **S. Syam**. (2022). A study on capturing acoustic behaviour in confined tube combustion using optical technique. *In International Combustion Symposium (INCOS-2022)*, The Combustion Institute, Aydin, Turkiye.
7. **S. Syam**, Rao, D. C. K., Karmakar, S., & Joarder, R. (2016). Puffing and micro-explosion behavior of Ethanol/Jet A-1 fuel droplets. *In 54th AIAA Aerospace Sciences Meeting (SciTech 2016)*, 2016-1682, AIAA. doi:10.2514/6.2016-1683
8. Rao, D. C. K., **S. Syam**, & Karmakar, S. (2016). Droplet combustion characteristics of butyl butyrate, limonene, and their blends with Jet A-1. *In 54th AIAA Aerospace Sciences Meeting (SciTech 2016)*, 2016-1682, AIAA.. doi:10.2514/6.2016-1682

Declaration

I do hereby declare that all the details provided above are accurate and true to the best of my knowledge and belief.

Place: Cleveland, Ohio, USA

Syam S.

Date: December 14, 2025