

Rudrodip Majumdar, Ph.D. (NCSU, USA)

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Current Thrust Areas: Solar Thermal Applications, Thermal & Thermochemical Energy Storages, Modeling of Renewable Energy Systems, Sustainable Transport Fuels, Resource Efficiency (Water, Energy, Material), Green Hydrogen Ecosystem, and Clean Energy Transition in Residential Cooking.

Additional Expertise: Electrothermal Plasma, Pulsed Power Systems, Plasma Material Interactions, Compressible Flows, Fusion Energy, Industrial Applications of Plasma.

Education:

Standard	Stream	Board/University	% marks/ CGPA	Year of leaving
Assistant Professor	Energy and Environment Program	National Institute of Advanced Studies, India		(23.08.19- Current)
Postdoctoral Fellow	Energy Sc. & Engg.	IIT Bombay	-	Oct. 2016-Aug. 2019
Postdoctoral Research Assistant	Nuclear Engineering	North Carolina State University	-	Dec. 2015- Aug. 2016
Ph.D.	Nuclear Engineering	North Carolina State University	3.963/4.0	Dec. 2015
M.Tech.	Nuclear Engineering	IIT Kanpur	10/10	2011
B.Tech.	Electronics and Communication Engineering	West Bengal University of Technology	8.84/10	2009

Other Research Interests:

- Application of Nuclear Radiation Technologies
- Thermal Fluid Dynamics / High Enthalpy Fluid Flows
- Market-based Assessment of the Global Green Energy Industry
- Technology Trends and Product Substitution
- Development of Scaling laws for bulk plasma parameters
- Application of Plasma Activated Water in Irrigation and Sanitation
- Applied Use of Open-source Satellite Imagery and Spatial Signatures
- Solid Waste Management Strategies (Plastic Waste and Electronic Waste)

Funded Research Projects (at NIAS):

- **Completed** a project titled “*An Evidence-based Approach to Access Energy Transition in Clean Cooking*” (Awarded by MECS Programme of Loughborough University, UK) **Role:** PI, **Duration:** 9 months, **Value:** GBP 25,000
- **Completed** a project titled “*A Status Report on Indian Rare Earth Industry*” (Awarded by IREL (India) Limited), **Role:** Principal Investigator, **Duration:** 9 months, **Value:** INR 28.71 Lakhs
- **Completed** a project titled “*Identification of Potential Sites for Nuclear Power Plants for a Sustainable Energy Mix*” (Awarded by BRNS) **Role:** Co-PI, **Duration:** 24 months, **Value:** INR 22.7 Lakhs

Other Collaborative Research Projects:

- Development of Advanced Numerical Model for Packed Bed Latent Heat Storage for High-Temperature Applications (Collaboration with Dr. **Sandip Kumar Saha**, Faculty, Mechanical Engg. Dept., IIT Bombay). (Funded research: scheme number: DST/TMD/MES/2K17/25(C))
- Development of an advanced model for the heat exchanger in a Solar Thermal Power Generation Loop. (Collaboration with Dr. **Sandip Kumar Saha**, Faculty, Mechanical Engg. Dept., IIT Bombay). (Funded research: scheme number: DST/TM/SERI/2k12/59(G))
- Data analysis (detailed XRD) of in-house Parkhomov-type experiment in search of sustainable low-energy reaction pathway for energy production (Collaboration with Dr. **Kannan Iyer**, Professor, Mechanical Engg. Dept., IIT Bombay). (Funded research: scheme number: RD/0116-NTPC000-005)

Innovative Research Contributions:

- Developed *geometry-based versatile scaling laws for bulk flow parameters of hypersonically expanding arc-ablated polycarbonate plasma* to investigate some popular issues pertinent to fusion and space applications (2015) as the lead researcher.
- Investigated *Dagum distribution in the context of estimation of fusion reactivity* and introduced this speed distribution in calculating the reactivity enhancement due to the presence of supra-thermal ion population (2016) as the lead researcher.

Technical Skill:

- **Programming Language Proficiency:** ‘C’, MATLAB
- **Research-Oriented Application Software:** ETFLOW (Electrothermal Plasma Code), COMSOL
- **Data Processing and Analysis Software:** MS-Excel, Full Prof Suite (XRD Analysis software)
- **Data Structures:** Using ‘C’
- **Certification Courses:** Implementation of ‘Data Structure’, C, Advanced C

Teaching Experiences:

- Developed and taught the course titled “*Advanced Energy Systems and Futuristic Solutions*” at NIAS (**Spring 2022, Spring 2023**).
- Developed and taught the course titled “*Major Conventional and Non-conventional Pathways to Harness Energy*” at NIAS (**Fall 2021, Fall 2022**).
- Developed and taught the course titled “*Advanced Energy Systems- I*” at NIAS (**Spring 2021**).
- Developed and taught the course titled “*Conventional and Non-conventional Pathways to Harness Energy – Focus on Renewable Energy Sources*” at NIAS (**Fall 2020**).

- Delivered lectures for the courses *Magnetohydrodynamics & Transport in Plasma* and *Kinetic Theory, Waves, & Non-Linear Effects in Plasmas* respectively, in participation with Professor Mohamed A. Bourham (bourham@ncsu.edu) at North Carolina State University.
- Served as a Teaching Assistant to Dr. Gerald Wicks (wicks@ncsu.edu) for the course *Radiation Safety and Shielding*, at North Carolina State University.
- Participated with Professor M.S. Kalra (mks@iitk.ac.in) in building up the course material for the course *Nuclear Fusion*, at IIT Kanpur.
- Served as a Teaching Assistant to Professor Prabhat Munshi (pmunshi@iitk.ac.in) and delivered lectures for the course *Nuclear and Reactor Physics*, at IIT Kanpur.

Honors and Involvement:

- Received **Best Paper Award** for research entitled, '*Evaluation of Energy Transition Readiness in the Residential Cooking Sector among the Low and Medium-Income Households in Bengaluru*', presented at the 3rd International Conference on Renewable Power (ICRP 2024), March 28-29, 2024, MAIT, Delhi.
- Became an *Alpha Nu Sigma honorary member* in May 2016, inducted by the American Nuclear Society.
- Elected as a *Professional Member of the American Nuclear Society* (ANS) in May 2016, based on education and experience.
- Became a *Phi Kappa Phi honorary member* at North Carolina State University in the Spring of 2013.
- Received '*Academic Excellence Award*' in February 2011, for maintaining a GPA of 10.0/10.0 during M.Tech. in Nuclear Engineering and Technology Programme at IIT Kanpur.
- *Graduate Teaching Assistantship* Award during Ph.D. at NCSU (August 2011 - December 2015).
- *Teaching Assistantship Award* during M.Tech. from MHRD, India (July 2009 - May 2011).

Brief description of M.Tech. Thesis:

Thesis Title: *Thermonuclear Fusion Reactivities for Maxwellian and Non-Maxwellian Ion Distributions* (Advisor: Dr. M.S. Kalra, IIT Kanpur)

Ion velocity distributions in magnetically confined thermonuclear fusion plasmas under reacting conditions can deviate considerably from Maxwellian distributions. The M.Tech. research work reported -

- Total fusion reactivities as well as fractional contributions to these from different ion energy groups, for Maxwellian ion distribution as well as a number of representative non-Maxwellian ion velocity distributions.
- Both isotropic as well as anisotropic distributions were taken into account. The effect of unequal ion kinetic temperatures on the fusion reactivity was also considered.
- The effect of unequal anisotropy in the ion velocity distributions of the two interacting species was investigated. For reactivity calculation, the D-T and D-He³ reaction temperatures were carefully chosen, keeping in mind the break-even and ignition conditions for each reaction.

Brief Description of Doctoral Dissertation:

Dissertation Title: *A Study of the Flow Patterns of Expanding Impurity Aerosol following a Disruption Event in a Fusion Reactor* (Advisors: Dr. Mohamed Bourham and Dr. John Gilligan, NCSU)

The doctoral dissertation encompassed adiabatic expansion of aerosol as an impurity in the post-disruption and thermal quench scenario inside the large chamber of a fusion reactor. Salient takeaways are as follows:

- A pulsed electrothermal plasma capillary source simulates hard disruption events by depositing transient radiant high heat flux onto the inner liner of the capillary, which in turn generates particulates from wall evaporation. The particulates form a plasma jet moving towards the capillary exit at high speed and high pressure.
- The main purpose of this computational work, backed by the data from actual electrothermal source experimental shots from the in-house facility at NCSU called “PIPE”, is to model the flow pattern and the evolution of the impurity particulates as they get ejected as a high pressure, high-temperature, and hyper-velocity jet from the simulated source term.
- 1-D Scaling laws for bulk flow parameters had been developed in a region-specific manner, keeping in mind the aspect ratio or in other words the relative dimensions of the various sections of the virtual system.
- The effect of temperature and the non-linearity of the adiabatic compressibility index on the supersonic flow patterns hint at the finer aspects like agglomeration, cluster formation, and recombination in the bulk plasma, as it undergoes isentropic expansion.
- The parameterized 2-D model is supposed to be able to predict the spatial distribution of the debris from the Plasma Facing Components or the migrated dust reasonably well.

Experiences with Low-temperature and Atmospheric Pressure Plasma at NCSU:

- Credited the course *Industrial Applications of Plasmas* at NCSU. The fundamental learnings from the course are as below:
 - Application of non-equilibrium cold plasma for surface modification (high reactivity at low gas temperatures)
 - Gas and surface-phase chemical reactions and plasma-assisted material processing (etch rate, selectivity, anisotropy)
 - Chemical kinetics of complex step-by-step reactions (Especially, diluted Ozone/ Oxygen systems)
 - Hands-on experience with the North Carolina Atmospheric Pressure Plasma System (NCAPS), a capacitively coupled, dielectric barrier discharge device operated at 1 atm. The device consists of two 60 x 60 cm parallel copper electrodes with adjustable gap spacing. Helium gas was used as a seed gas. The function generator is tuned to operate in a frequency range of 5-10 kHz.
 - Measurement of electron density and electron temperature using Langmuir Probe.

Additionally, I have experience of analyzing the plasma images captured using FASTCAM SA4 capable of providing 1024x1024 resolution, 500000 fps, and a shutter speed of 1 microsecond. The aperture on the camera and the focus of the lens were adjusted manually. All other features and settings were adjusted in the Photron FASTCAM software.

➤ Experiences on Material Characterization (from IIT Bombay Stint):

I have worked on SEM images for inorganic salt grains, and I am capable of analyzing the changes and defects in materials from the images. I have done extensive XRD analysis for Al-Ni intermetallic compounds to identify the existence of *Self-propagating High-temperature Synthesis* reactions.

Brief Description of Renewable Energy-related Postdoctoral works (IIT Bombay):

Project title: *Development of control-based dynamic model for medium temperature solar thermal systems utilizing thermal stratification* (Collaborators: Dr. Sandip K. Saha & Dr. Suneet Singh)

Salient contributions:

- Introduced novel concept of thermally stratified pressurized water tank in collector loop.
- Developed moving boundary model for ORC heat exchanger with time-varying pressure as independent variable.
- Studied the Effect of time-varying HTF temperature on moving boundary characteristics.

- Studied the Transient variation of the temperatures in the ORC heat exchanger tube wall.
- Significant enhancement was found in energy transfer efficiency at solar collector.

Project title: *Effect of varying extent of PCM capsule filling on thermal stratification performance of a storage tank* (Collaborator: Dr. Sandip K. Saha)

Salient findings:

- Developed a novel numerical model for investigating thermal stratification in TES.
- The model includes the detailed heat transfer between HTF and encapsulated PCM.
- Compared to steel and rock, PCM provides a better thermal gradient across the storage tank.
- PCM melting temperature affects the stratification number and storage efficiency.
- Increasing the flow rate of HTF significantly improves extraction efficiency during discharging.

List of Refereed International Journal Publications:

- [1] S.S. Das, R. Majumdar, A.V. Krishnan, R. Srikanth, ‘Exploring Urban Water-Energy Nexus: A Case Study of Thermal Power Plants in Raichur and Ballari Districts in Karnataka’, Natural Resources Forum – A UN Sustainable Development Journal, pp. 1-31, 2024. (IF: 3.3) DOI: [10.1111/1477-8947.12507](https://doi.org/10.1111/1477-8947.12507) (2 Citations)
- [2] H. Khurana, R. Majumdar, and S. K. Saha, ‘Improved Realistic Stratification Model for Estimating Thermocline Thickness in Vertical Thermal Energy Storage Undergoing Simultaneous Charging and Discharging’, Journal of Energy Storage, Vol. 82, Article 110490, 2024. (IF: 9.4) DOI: [10.1016/j.est.2024.110490](https://doi.org/10.1016/j.est.2024.110490) (9 Citations)
- [3] K. Saurabh, and R. Majumdar, ‘Sub-segment-based Approach for Assessing Growth and Energy Transition Trajectories of Indian Two-Wheelers’, Journal of Cleaner Production, Vol. 430, Article 139559, 2023. (IF: 11.1) DOI: [10.1016/j.jclepro.2023.139559](https://doi.org/10.1016/j.jclepro.2023.139559) (4 Citations)
- [4] A.S. Pujari, R. Majumdar, S. K. Saha, C. Subramaniam, ‘Annular vertical cylindrical thermochemical storage system with innovative flow arrangements for improved heat dispatch towards space heating requirements’, Renewable Energy, Vol. 217, Article 119168, 2023. (IF: 8.7) DOI: [10.1016/j.renene.2023.119168](https://doi.org/10.1016/j.renene.2023.119168) (8 Citations)
- [5] H. Khurana, R. Majumdar, and S. K. Saha, ‘Thermal stratification characteristics during simultaneous charging and discharging for different storage tank geometries with immersed discharging coil’, Applied Thermal Engineering, Vol. 225, Article 120235, 2023. (IF: 6.465) DOI: [10.1016/j.applthermaleng.2023.120235](https://doi.org/10.1016/j.applthermaleng.2023.120235) (15 Citations)
- [6] A. Mohanty, M.B. Rajani, R. Majumdar, S. Nayak, ‘Improved Geospatial Analysis of Shoreline Modification Using a Weighted-Average-based Novel Formulation’, Earth Surface Processes and Landforms, Vol. 48(5), pp. 863-886, 2023. (IF: 3.956) DOI: [10.1002/esp.5522](https://doi.org/10.1002/esp.5522) (2 Citations)
- [7] H. Khurana, R. Majumdar, and S. K. Saha, ‘Experimental investigation of heat dispatch controllability through simultaneous charging-discharging and stand-alone discharging operations in vertical cylindrical sensible heat storage tank’, Journal of Energy Storage, Vol. 54, 2022. (IF: 9.4) DOI: [10.1016/j.est.2022.105268](https://doi.org/10.1016/j.est.2022.105268) (15 Citations)
- [8] H. Khurana, R. Majumdar, and S. K. Saha, ‘Response Surface Methodology-based Prediction Model for Working Fluid Temperature during Stand-Alone Operation of Vertical Cylindrical Thermal Energy Storage Tank’, Renewable Energy, Volume 188, pp. 619-636, 2022. (IF: 8.7) DOI: [10.1016/j.renene.2022.02.040](https://doi.org/10.1016/j.renene.2022.02.040) (28 Citations)
- [9] H.G. Kamath, R. Majumdar, A.V. Krishnan, and R. Srikanth, ‘Cost and environmental benefits of coal-concentrated solar power (CSP) hybridization in India’, Vol. 240, Article 122805, Energy, 2022. (IF: 9.0) DOI: [10.1016/j.energy.2021.122805](https://doi.org/10.1016/j.energy.2021.122805) (26 Citations)
- [10] V.P. Lavanyaa, S. Varshini, S.S. Mitra, K.M. Hungund, R. Majumdar, R. Srikanth, ‘Geospatial Modelling for Estimation of PM2.5 Concentrations in Two Megacities in Peninsular India’, Aerosol Air Qual. Res., Special Issue: Air Pollution and its Impact in South and Southeast Asia (III), Vol. 22 (7), Article 220110, pp. 1-20, 2022. (IF: 4.53) DOI: [10.4209/aaqr.220110](https://doi.org/10.4209/aaqr.220110) (5 Citations)
- [11] H. Santhanam, R. Majumdar, ‘Quantification of green-blue ratios, impervious surface area and pace of urbanisation for sustainable management of urban lake – land zones in India -a case study from Bengaluru city’, Journal of Urban Management, Vol. 11 (3), pp. 310-320, 2022. (IF: 6.1) DOI: [10.1016/j.jum.2022.03.001](https://doi.org/10.1016/j.jum.2022.03.001) (23 Citations)

- [12] A. Choudhary, R. Majumdar, and S. K. Saha, 'Hybridization of Geothermal Source with ORC-based Load Loop for Uninterrupted Generation of Steady Power', *International Journal of Sustainable Energy*, Vol. 41 (1), pp. 58-84, 2022. (IF: 3.1) DOI: [10.1080/14786451.2021.1895779](https://doi.org/10.1080/14786451.2021.1895779) (3 Citations)
- [13] H. Khurana, S. Tiwari, R. Majumdar, and S. K. Saha, 'Comparative Evaluation of Circular Truncated-Cone and Paraboloid Shapes for Thermal Energy Storage Tanks based on Thermal Stratification Performance', *Journal of Energy Storage*, Vol. 34, Article 102191, 2021. (IF: 9.4) DOI: [10.1016/j.est.2020.102191](https://doi.org/10.1016/j.est.2020.102191) (27 Citations)
- [14] R. Majumdar, S. K. Saha, 'Computational Study of Performance of Cascaded Multi-layered Packed-bed Thermal Energy Storage for High Temperature Applications', *Journal of Energy Storage*, Vol. 32, Article no. 101930, 2020. (IF: 9.4) DOI: [10.1016/j.est.2020.101930](https://doi.org/10.1016/j.est.2020.101930) (32 Citations)
- [15] R. Majumdar, S. K. Saha, A. Patki, 'Novel Dimension Scaling for Optimal Mass Flow Rate Estimation in Low Temperature Flat Plate Solar Collector based on Thermal Performance Parameters', *Thermal Science and Engineering Progress*, Vol. 19, Article no. 100569, 2020. (IF: 4.8) DOI: [10.1016/j.tsep.2020.100569](https://doi.org/10.1016/j.tsep.2020.100569) (11 Citations)
- [16] A. Mukherjee, R. Majumdar, S. K. Saha, C. Subramaniam, L. Kumar, 'Performance evaluation of an open thermochemical energy storage system integrated with flat plate solar collector', *Applied Thermal Engineering*, Vol. 173, Article 115218, 2020. (IF: 6.465) DOI: [10.1016/j.applthermaleng.2020.115218](https://doi.org/10.1016/j.applthermaleng.2020.115218) (36 Citations)
- [17] R. Majumdar, S. K. Saha, 'Effect of Varying Extent of PCM Capsule Filling on Thermal Stratification Performance of a Storage Tank', *Energy*, Vol. 178, pp. 1-20, 2019. (IF: 9.0) DOI: [10.1016/j.energy.2019.04.101](https://doi.org/10.1016/j.energy.2019.04.101) (56 Citations)
- [18] N. Kumar, R. Majumdar, S. Singh, 'Predictor-Corrector Nodal Integral Method for Simulation of High Reynolds Number Fluid Flow using Larger Time Steps in Burgers' Equation', *Computers and Mathematics with Applications*, Vol. 79 (5), pp. 1362-1381, 2020. (IF: 3.476) DOI: [10.1016/j.camwa.2019.09.001](https://doi.org/10.1016/j.camwa.2019.09.001) (10 Citations)
- [19] A. Mukherjee, R. Majumdar, S. K. Saha, L. Kumar, C. Subramaniam, 'Assessment of open thermochemical energy storage system performance for low temperature heating applications', *Applied Thermal Engineering*, Vol. 156, Pages 453-470, 2019. (IF: 6.465) DOI: [10.1016/j.applthermaleng.2019.04.096](https://doi.org/10.1016/j.applthermaleng.2019.04.096) (30 Citations)
- [20] N. Kumar, R. Majumdar, S. Singh, 'Physics-Based Preconditioning of Jacobian Free Newton Krylov for Burgers' Equation Using Modified Nodal Integral Method', *Progress in Nuclear Energy*, Vol. 117, 103104, 2019. (IF: 2.256) DOI: [10.1016/j.pnucene.2019.103104](https://doi.org/10.1016/j.pnucene.2019.103104) (9 Citations)
- [21] K. Sakalkale, R. Majumdar, S. K. Saha, 'An Investigation of Two-Phase Flow Regimes for Microchannels based on Void Fraction', *IEEE Transactions on Components, Packaging and Manufacturing Technology*, Vol. 9 (11), pp. 2189-2199, 2019. (IF: 2.2) DOI: [10.1109/TCPMT.2019.2918925](https://doi.org/10.1109/TCPMT.2019.2918925) (3 Citations)
- [22] R. Majumdar, S. K. Saha, S. Singh, 'Evaluation of Transient Characteristics of Medium Temperature Solar Thermal Systems utilizing Thermal Stratification', *Applied Energy*, Volume 224., pp. 69-85, 2018, (IF: 11.446) DOI: [10.1016/j.apenergy.2018.04.083](https://doi.org/10.1016/j.apenergy.2018.04.083) (16 Citations)
- [23] R. Majumdar, S. Singh, S. K. Saha, 'Quasi-Steady State Moving Boundary Reduced Order Model of Two-Phase Flow for ORC Refrigerant in Solar-Thermal Heat Exchanger', *Renewable Energy*, Volume 126, pp. 830-843, 2018. DOI: [10.1016/j.renene.2018.04.008](https://doi.org/10.1016/j.renene.2018.04.008) (IF: 8.7) (16 Citations)
- [24] Rudrodip Majumdar, Mohamed A. Bourham, 'Radial Profile of Plasma Flow Parameters Following Evolution of Electrothermal Polycarbonate Plasma into a Large Chamber Simulating Impurity Expansion in Fusion Reactor Vacuum Vessel', *J. Fusion Energy*, 35(6), pp. 795-806, 2016. DOI: [10.1007/s10894-016-0107-9](https://doi.org/10.1007/s10894-016-0107-9). (IF: 1.202) (1 Citation)
- [25] Rudrodip Majumdar, Debraj Das, 'Estimation of Total Fusion Reactivity and Contribution from Supra-thermal Tail using 3-parameter Dagum Ion Speed Distribution', *Annals of Nuclear Energy*, Volume 97, pp. 66-75, 2016. (IF: 1.776) (4 Citations)
- [26] R. Majumdar, M. A. Bourham, 'Temperature-Dependent Hypersonic Flow Patterns of Expanding High-Density Metal Vapor Plasma from Capillary Source Simulating Plasma Flow Following a Fusion Disruption', *J. Fusion Energy*, 35(2), pp. 312-326, 2016. DOI: [10.1007/s10894-015-0027-0](https://doi.org/10.1007/s10894-015-0027-0). (IF: 1.202)
- [27] R. Majumdar, M. A. Bourham, 'Effect of Plasma Temperature and Nonlinearity of the Adiabatic Compressibility Index on Flow Parameters for Hypersonic Aerosol Expansion Following a Plasma Disruption', *J. Fusion Energy*, 34(6), pp 1269-1277, 2015. DOI: [10.1007/s10894-015-9960-1](https://doi.org/10.1007/s10894-015-9960-1). (IF: 1.202) (4 Citations)

- [28] R. Majumdar, T. Banerjee, ‘Effect of Changing Source Capillary Radius on Bulk Flow Parameter Scaling Laws for Hypersonically Expanding Arc-Ablated Polycarbonate Plasma for Fusion and Space Applications’, J. Fusion Energy, 34(6), pp 1234-1245, 2015. DOI: [10.1007/s10894-015-9947-y](https://doi.org/10.1007/s10894-015-9947-y). (IF: 1.202)
- [29] R. Majumdar, J. G. Gilligan, A. L. Winfrey, and M. A. Bourham, ‘Scaling Laws of Bulk Plasma Parameters for a 1-D Flow through a Capillary with Extended Converging-Diverging Nozzle for Simulated Expansion into Fusion Reactor Chamber’, J. Fusion Energy, 34(4), pp. 905-910, 2015. DOI: [10.1007/s10894-015-9899-2](https://doi.org/10.1007/s10894-015-9899-2). (IF: 1.202) (10 Citations)
- [30] R. Majumdar, J. G. Gilligan, A. L. Winfrey, and M. A. Bourham, ‘Supersonic Flow Patterns from Electrothermal Plasma Source for Simulated Ablation and Aerosol Expansion Following a Fusion Disruption’, J Fusion Energy, 33(1), pp. 25-31, 2014. DOI: [10.1007/s10894-013-9635-8](https://doi.org/10.1007/s10894-013-9635-8). (IF: 1.202) (11 Citations)
- [31] D. Nath, R. Majumdar, M. S. Kalra, ‘Thermonuclear Fusion Reactivities for Drifting Tri-Maxwellian Ion Velocity Distributions’, J Fusion Energy, 32, pp. 457–463, 2013. DOI: [10.1007/s10894-013-9594-0](https://doi.org/10.1007/s10894-013-9594-0) (IF:1.202) (12 Citations)

List of Refereed International Conference Publications:

- [1] Anas A.E Ahmed, Rudrodip Majumdar, Sandip K. Saha, ‘Comparison of Stratification Performance in Oil-based Thermal Storage Tank for Different Immersed Discharging Coil Configurations’. Proceedings of the 5th International Conference on Advances in Energy Research and Applications (ICAERA 2024), Lisbon, Portugal, November 21 - 23, 2024. (Paper No. 131) DOI: [10.11159/icaera24.131](https://doi.org/10.11159/icaera24.131)
- [2] R. Kumar, and R. Majumdar, ‘Evaluation of Energy Transition Readiness in the Residential Cooking Sector among the Low and Medium-Income Households in Bengaluru’, Proceedings of the 3rd International Conference on Renewable Power (ICRP 2024), March 28-29, 2024, MAIT, Delhi, Renewable Power for Sustainable Growth: Volume 1, Lecture Notes in Electrical Engineering (LNEE), Springer. (Paper No. 231)
- [3] S.S. Das, R. Majumdar, A.V. Krishnan, R. Srikanth, ‘A Methodological Framework for Strategic Electricity Generation Planning in India: Assessing Resource Adequacy through Probability Risk Metrics’, Proceedings of the 3rd International Conference on Renewable Power (ICRP), March 28-29, 2024, MAIT, Delhi, Renewable Power for Sustainable Growth: Volume 1, Lecture Notes in Electrical Engineering (LNEE), Springer. (Paper No. 232) (1 Citation)
- [4] A.S. Pujari, R. Majumdar, C. Subramaniam, S. K. Saha, ‘Study of Different Flow Configurations of Radial Flow Annular Reactor for Thermochemical Energy Storage’, Proceedings of the 27th National and 5th International ISHMT-ASTFE Heat and Mass Transfer Conference, December 14-17, 2023, IIT Patna (IHMTTC-2023), pp. 821-826. (Paper No. 278) DOI: [10.1615/IHMTTC-2023.1330](https://doi.org/10.1615/IHMTTC-2023.1330) (1 Citation)
- [5] Anas A. E. Ahmed, R. Majumdar, and S. K. Saha, ‘Experimental Investigation of Stratified Sensible Thermal Energy Storage using Silicone Oil’, Proceedings of the 27th National and 5th International ISHMT-ASTFE Heat and Mass Transfer Conference, December 14-17, 2023, IIT Patna (IHMTTC-2023), pp. 827-832. (Paper No. 279) DOI: [10.1615/IHMTTC-2023.1340](https://doi.org/10.1615/IHMTTC-2023.1340) (1 Citation)
- [6] A.S Pujari, R. Majumdar, and S. K. Saha, ‘Thermochemical Energy Storage Using Radial Flow Annular Reactor for Attaining Lower Pressure Drop’, Proceedings of the 8th World Congress on Momentum, Heat and Mass Transfer (MHMT'23), 26-28 March 2023, Lisbon, Portugal. (Paper No. ENFHT 170) DOI: [10.11159/enfht23.170](https://doi.org/10.11159/enfht23.170) (1 Citation)
- [7] K. Saurabh, and R. Majumdar, ‘Conceptualizing Integrated Life-Cycle Management for Sustainable and Optimal Utilization of Used Cooking Oil (UCO)’, VII International Conference on Sustainable Energy and Environmental Challenges (VII SEEC) 16 –18 December 2022, IIT BHU, Varanasi, India. (Paper ID: SEEC2022_098) (1 Citation)
- [8] K. Saurabh, and R. Majumdar, ‘Projection of Two-Wheeler Vehicle Fleet in India using Road Density per Capita for Accurate Emission Estimation’, VII International Conference on Sustainable Energy and Environmental Challenges (VII SEEC) 16 –18 December 2022, IIT BHU, Varanasi, India. (Paper ID: SEEC2022_072) (1 Citation)
- [9] H. Khurana, R. Majumdar, and S. K. Saha, ‘Formulation of Prediction Model for Working Fluid Temperature in a Vertical Paraboloid Shaped Thermal Energy Storage Tank during Stand-Alone Operation’, Proceedings of 16th International Conference on Heat Transfer, Fluid Mechanics, and Thermodynamics (HEFAT-2022), Virtual Conference, 08-10 August 2022, pp. 507-512. (3 Citations)
- [10] K. Saurabh, and R. Majumdar, ‘An approach towards comprehensive Life Cycle Assessment (LCA) for surface transport automotive fuels’, International Conference on Sustainable Technology and Development (ICSTD) -2021,

31st October - 3rd November 2021, Southern University of Science and Technology (SUSTech) and Elsevier, Shenzhen China. (2 Citations)

[11] Lavanyaa V P, S. S. Mitra, H. Kamath, Srikanth R., and R. Majumdar, 'Impact of Land-Use Pattern on Particulate Matter Pollution in a Mega-City in India', Springer Nature Proceedings of 3rd Euro-Mediterranean Conference for Environmental Integration (EMCEI 2021), 10-13 June, Sousse, Tunisia, 2021, pp 633–636. DOI: [10.1007/978-3-031-43922-3_142](https://doi.org/10.1007/978-3-031-43922-3_142)

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[16] R. Majumdar and Sandip K. Saha, 'Quasi-steady state reduced order moving boundary model of ORC heat exchanger for medium temperature solar-thermal systems', Proceedings of the International Conference on Sustainable Energy and Environmental Challenges (SEEC-2018) 01– 03 January 2018, IISc Bangalore, India. (4 Citations)

[17] R. Majumdar, M.S. Kalra, 'Multi-group fusion reactivities for Maxwellian and non-Maxwellian ion velocity distributions', Proc. 32nd Annual Conference of the Canadian Nuclear Society, Niagara Falls, Ontario, Canada, 5-8 June 2011. ISBN: 9781618394149, 1158 pages (2 Vols.). (4 Citations)

Invited Book Chapter

[1] R. Majumdar, 'Non-degradable Waste Incursion, Environment and Ecology – A Case of Densely Populated Urban Settings in India': Chapter 10 in P. K. Joshi et al. (eds.) Geospatial Science for Urban Ecosystems – Insights from India and Beyond: The Urban Book Series. Springer Nature Switzerland AG, 2025. (Accepted, in Press)

[2] A. Pandey, and R. Majumdar, 'Assessing End-of-Life Room Air Conditioner Recycling Potential for Sustainable Resource Utilization in India: A Case Study for Reducing Environmental Burden': Chapter 3 in P. Pathak, R. R. Srivastava, S. Ilyas (eds.) Anthropogenic Environmental Hazards: Compensation and Mitigation. Springer International Publishing AG, 2023. (DOI: [10.1007/978-3-031-41013-0_3](https://doi.org/10.1007/978-3-031-41013-0_3)) ISBN 978-3-031-41012-3 (3 Citations)

[3] K. Saurabh, and R. Majumdar, 'Functional Use-based Positioning of Conventional Vehicles in conjunction with Alternate Low-Emission Fuels': Chapter 5 in Shukla P.C. et al. (eds.) Renewable Fuels for Sustainable Mobility: Energy, Environment, and Sustainability (ENENSU) Series. Springer, Singapore, 2023. (DOI: [10.1007/978-981-99-1392-3_5](https://doi.org/10.1007/978-981-99-1392-3_5)) ISBN 978-981-99-1391-6 (7 Citations)

[4] K. Saurabh, and R. Majumdar, 'Fuels for Sustainable Transport in India': Chapter 3 in Di Blasio G. et al. (eds.) Clean Fuels for Mobility: Energy, Environment, and Sustainability (ENENSU) Series. Springer, Singapore, 2022. (DOI: [10.1007/978-981-16-8747-1_3](https://doi.org/10.1007/978-981-16-8747-1_3)) ISBN 978-981-16-8746-4 (11 Citations)

[5] S. Dhyani, R. Majumdar, H. Santhanam, 'Scaling-up Nature based Solutions for mainstreaming urban resilience in Indian cities': Chapter 12 in Mukherjee M., Shaw R. (eds.) Ecosystem-Based Disaster and Climate Resilience. Disaster and Risk Research: GADRI Book Series. Springer, Singapore, 2021. (DOI: [10.1007/978-981-16-4815-1_12](https://doi.org/10.1007/978-981-16-4815-1_12)) ISBN 978-981-16-4814-4 (14 Citations)

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Book Chapter Selected on Merit from Open Competition (through Rigorous Peer Review Process)

- [1] S.S. Das, R. Majumdar, A.V. Krishnan, R. Srikanth, 'Assessing Water Consumption in Indian Thermal Power Plants and Parametric Strategy for Optimal Usage: An Explanatory Approach Using Machine Learning Algorithms': In A. Halog et al. (eds.) *Water Use Efficiency, Sustainability and Circular Economy*, Elsevier, 2025. ISBN 9780443267505 (Accepted, in Press)
- [2] A. Pandey, and R. Majumdar, 'Energy Efficiency and Circularity: Insights from Adoption Trends of Washing Machines, Critical Materials Demand and Responsible Use Strategies': Chapter 1 in R. Osabohien (ed.) *Energy Efficiency in Critical Times: Security, Economics and Transition*, Elsevier, 2025. (Accepted, in Press)
- [3] A. Pandey, and R. Majumdar, 'Technological Trends in Electric Passenger Car Segment in India and Medium-Term Demand for Magnet-Based Rare Earth Materials': Chapter 15 in D. Lakshmi et al. (eds.) *E-Mobility in Electrical Energy Systems for Sustainability*, pp. 321-342, IGI Global, 2024. (DOI: [10.4018/979-8-3693-2611-4.ch015](https://doi.org/10.4018/979-8-3693-2611-4.ch015)) ISBN13: 9798369326114 (1 Citation)
- [4] R. Majumdar, 'Sludge hygienisation – a novel technology for urban areas to deal with incursion of COVID-19 viral particles in wastewater': Chapter 11 in C. Chakrabarty et al. (eds.): *The Impact of the COVID-19 Pandemic on Green Societies: Environmental Sustainability*, Springer Nature Switzerland, 2021. ISBN 978-3-030-66489-3 (DOI: [10.1007/978-3-030-66490-9](https://doi.org/10.1007/978-3-030-66490-9)) (3 Citations)

Research Report:

- [1] R. Majumdar, R.S. Yadav, A.V. Krishnan, R. Srikanth, **Research Report on 'Technology Assessment of Select Small and Modular Reactors (SMRs) to Achieve Net Zero with Energy Security in India'**, 2024. **Report No.** NIAS/NSE/EECP/R/RR/14/2024
- [2] R. Majumdar, R. Kumar, **MECS Report on 'An Evidence-based Approach to Assess the Energy Transition in Clean Cooking'**, 2024. <https://mecs.org.uk/wp-content/uploads/2024/12/An-evidence-based-approach-to-assess-the-transition-in-clean-cooking.pdf>
- [3] S.S. Das, R. Majumdar, A.V. Krishnan, R. Srikanth, **Research Report on 'Urban Water-Energy Nexus: A Case Study of Select Thermal Power Plants in Water-Stressed Regions in India'**, 2023. **Report No.** NIAS/NSE/EECP/U/RR/01/2023 (2 Citations)

Popular Scientific Dissemination:

- [1] R. Majumdar, 'India's green energy goals: Pragmatic way forward'. Sunday Edition (30 October 2022) of the Delhi-based Daily "The Pioneer". <Access from: <https://www.dailypioneer.com/2022/sunday-edition/india---s-green-energy-goals--pragmatic-way-forward.html> > (3 Citations)
- [2] R. Majumdar, 'Habitat Monitoring for TB Risk Mitigation and an Integrated Information-based Decision-Making Framework for Dense Urban Settings: An Approach'. *TBInfo* 2(1): 1-9, 2022.
- [3] R. Majumdar, 'COVID -Induced Pulmonary Fibrosis and the Possible Linkages with the Tuberculosis Infection: An Observation'. *TBInfo* 1(3): 1-7, 2021. (1 Citation)
- [4] R. Majumdar, 'TB in Zoo Elephants and the Transmission of Infection into Zookeepers due to Extended Proximity during COVID-19 Pandemic', *TBInfo*, 1(2): 1-7, 2021.
- [5] R. Majumdar, 'Tuberculosis: A Brief Overview and Recent Advancements in Clinical Treatment', *TBInfo*, 1 (1): 11-15, 2020.

Professional Services:

- Serving as a **Review Editor** for '*Frontiers in Energy Research-Energy Storage Section*' w.e.f. 06.01.2023.
- Served as reviewer for Edited Volume titled '**E-Mobility in Electrical Energy Systems for Sustainability**', ISBN13: 9798369326114, IGI Global.
- Served as reviewer for Edited Volume titled '**A Sustainable Future with E-Mobility: Concepts, Challenges, and Implementations**', ISBN13: 9798369352472, IGI Global.
- Served as a journal article reviewer for '*Applied Energy*', ISSN: 0306-2619, Elsevier.
- Served as a journal article reviewer for '*Energy Reports*', ISSN: 2352-4847, Elsevier.
- Served as a journal article reviewer for '*Journal of Building Engineering*', ISSN: 2352-7102, Elsevier.
- Served as a journal article reviewer for '*Environmental Development*', ISSN: 2211-4645, Elsevier.

- Served as a journal article reviewer for '*Energy for Sustainable Development*', ISSN: 0973-0826, Elsevier.
- Served as a journal article reviewer for '*Energy*', ISSN: 0360-5442, Elsevier.
- Served as a journal article reviewer for '*Journal of Energy Storage*', ISSN: 2352-152X, Elsevier.
- Served as a journal article reviewer for '*Energy Research & Social Science*', ISSN: 2214-6296, Elsevier.
- Served as a journal article reviewer for '*Sustainable Cities and Society*', ISSN: 2210-6707, Elsevier.
- Served as a journal article reviewer for '*Journal of Fusion Energy*', Print ISSN: 0164-0313, Springer US.
- Served as a journal article reviewer for '*International Journal of RF and Microwave Computer-Aided Engineering*', Wiley. Online ISSN: 1099-047X.
- Served as a journal article reviewer for '*Scientia Iranica*', Print ISSN 1026-3098, Online ISSN 2345-3605.
- Served as a journal article reviewer for '*Frontiers in Energy Research*', Electronic ISSN 2296-598X.
- Served as a reviewer for 7th International Conference on Advances in Energy Research (ICAER 2019), held at IIT Bombay, India.
- Served as a reviewer for 7th International and 45th National Conference on Fluid Mechanics and Fluid Power (FMFP 2018), held at IIT Bombay, India.
- Served as a reviewer for the Springer Monograph Series **Energy, Environment, and Sustainability (ENENSU)** (**Series Editor:** Prof. Avinash Agarwal, IIT Kanpur)

Capacity Building, Community Engagement, Dissemination:

- Invited as a Panelist on the theme "*Role of DISCOMs in large-scale scaling up of eCooking*" in Modern Energy Cooking Forum 2024, New Delhi.
- Invited to present research findings on "*Evidence-based Approach to Assess the Energy Transition in the Residential Cooking Sector in India*" in a **Special Session - "Research on eCooking"** in Modern Energy Cooking Forum 2024, New Delhi.
- Invited as a Panelist in the 18th EXCEED Conference on the Theme: "*Energy Transition and Sustainable Road Transportation*" in Delhi Organized by the Sustainable Development Foundation (EKDKN) & Supported by the Ministry of Road Transport and Highways, GOI.
- Delivered an invited talk on 12 December 2024 in the **Theme Meeting on the Role of Rare Earth Metals, Alloys & Compounds for Self-Reliant India** (REMAC – 2024) in Anushaktinagar, Mumbai.
- Delivered an invited talk on 01 March 2024 during the **Round Table Discussion on Solid Waste Management** organized by the Greater Bengaluru Parisara Foundation (GBPF) in association with the National Institute of Advanced Studies (NIAS).
- Delivered an invited talk during a Panel Discussion on the theme "*Societal Impact through eCooking*" that took place at Tagore Theatre in Thiruvananthapuram on 08 February 2024 as a key event of the **International Energy Festival of Kerala (IEFK) 2024** organized by **Energy Management Centre (EMC)-Kerala**.
- Delivered the keynote talk on the theme "*Mindful Horizons: Interdisciplinary Dialogues on Sustainable Future*" at Mount Carmel College, Autonomous (Bengaluru) on 11 January 2024, **as the Chief Guest of Academicia-2024 Fest**.
- Delivered a talk on the theme "*Engaging Youth for eCooking*" in the Virtual Talk Series Phase III on Transitioning to Modern Energy for Cooking organized by Finovista, IN-Country partner of MECS Programme, Loughborough University (UK) in India on December 21st, 2023.
- Delivered an invited talk titled "*Green Hydrogen and Rare Earth Minerals: Opportunities and Challenges*" on 30 November 2023 as a part of the NIAS-DST Training Programme on "**Science & Technology: Global Developments and Perspectives**" which took place at NIAS, Bengaluru over the 2 weeks 20 Nov –1 Dec. 2023.
- Delivered an invited talk titled "*Evaluation of North Korea's Nuclear Program: Is It for Energy Security?*" on 11 August 2023 during the **Panel Discussion** at Christ University (Bengaluru) organized by the Centre for East Asian Studies (Department of International Studies, Political Science and History), Christ University in Collaboration with NIAS.
- Delivered a talk titled "*India's Energy Scenario - Position of Hydrogen and A Pragmatic Future Trajectory in Connection with India's Development*" at the **Inaugural Conference India@75 - Journey of a Young Nation**

conducted at NIAS on 08 May 2023, as a part of ‘Azadi Ka Amrit Mahotsav’ (AKAM) supported by Ministry of Culture, GoI.

- Organized NIAS-MECS Workshop and delivered a talk on the theme “*Evidence-based Approach to Assess the Energy Transition in the Residential Cooking Sector*” on 14 March 2023 at NIAS.

Quoted in the Media:

[1] The article “**Once Upon a Lake**” (dt. 25 May 2022), by correspondent Ms. Garima Prasher in **Bangalore Mirror Bureau** was based on a personal interview. <Citation: <https://bangaloremirror.indiatimes.com/bangalore/cover-story/once-upon-a-lake/articleshow/91715035.cms> >

[2] Quoted by The **Hindu Bureau (Kerala Edition)** in connection with a Panel Discussion on the theme “**Societal Impact through eCooking Transition**” that took place as a key event of the International Energy Festival of Kerala (IEFK) 2024 organized by Energy Management Centre (EMC) Kerala. <Citation: <https://www.thehindu.com/news/national/kerala/e-cooking-becomes-a-topic-of-discussion-at-international-energy-festival-of-kerala/article67826592.ece>>

[3] Quoted by **Deccan Herald** in connection with the NIAS study on the Urban Water-Energy Nexus focusing on Water-stressed Raichur and Ballari Districts in Karnataka. <Citation: <https://www.deccanherald.com/india/karnataka/study-suggests-use-of-waste-water-in-thermal-plants-at-ballari-raichur-3105449>>

[4] Quoted by **News Karnataka** in connection with the NIAS study on the Sustainable Resource Utilization Approach for Water-stressed Raichur and Ballari Districts in Karnataka. <Citation: <https://newskarnataka.com/sci-tech/treated-wastewater-to-enhance-sustainability-in-ballari-and-raichur/16072024/>>

Administrative Responsibilities:

- Served as the Departmental Placement Coordinator (DPC) of Nuclear Engg. and Tech. Programme, IIT Kanpur from 03.04.2010 to 07.04.2011.
- Served as the Interview Committee member for selecting Project Associates and Research Fellows at NIAS.
- Served as the Library and Publications Committee member at NIAS from 02.01.2021 to 31.12.2022.
- Served as a member of the Standing Committee - NIAS Website & Outreach from 01.01.2023 to 31.12.2024.
- Served as the Chairman of the committee for physical verification of assets vis-à-vis assets register maintenance at NIAS in July 2023.
- Serving as a member of the Standing Committee related to the NIAS website w.e.f. 01.01.2023.
- Serving as a member of the Grievance Redressal Committee at NIAS w.e.f. 01.01.2023.

References:

Available upon request.