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Ashok Das

Curriculum Vitae

Research Experiences & Positions

2024 – to date **Assistant Professor**, *Department of Mathematics & Computing*, Indian Institute of Technology (ISM) Dhanabd, Dhanbad, India.

Aug-Dec 2023 **Post-doctoral Researcher**, *Bernal Institute*, School of Engineering, University of Limerick, Limerick, Ireland, *under supervision of Dr. Orest Shardt.*

- This research was funded by the Dairy Processing Technology Centre (DPTC), University of Limerick.

2022 – 2023 **Post-doctoral Researcher**, Insitut Jean Lamour (Materials Science and Engineering - Metallurgy Department), Université de Lorraine, Nancy, France, *under supervision of Dr. Jean-Sébastien Kroll Rabotin, Dr. Thibault Quatravaux, and Prof. Jean-Pierre Bellot.*

- This research was funded by the LabEx DAMAS, France.

Mar-Apr 2019 **Visiting Researcher**, Institute of Solids Process Engineering and Particle Technology, TUHH, Germany, *under supervision of Prof. Maksym Dosta and Prof. Stefan Heinrich.*

- The visit was funded by the Alexander von Humboldt Foundation within the framework of Research Group Linkage Programme.

2016 – 2022 **Ph.D. Research Student**, Department of Mathematics, IIT Kharagpur, India, *under supervision of Prof. Jitendra Kumar.*

Education

2016 – 2022 **Ph.D. in Applied Mathematics**, *Department of Mathematics*, Indian Institute of Technology Kharagpur, West Bengal, India.

- **Ph.D. Thesis:** "*Modeling and Simulation of Particulate Processes Involving Aggregation and Breakage*," under supervision of **Prof. Jitendra Kumar**.

2014 – 2016 **M.Sc. in Mathematics**, CGPA: 9.49/10, Department of Mathematics, Indian Institute of Technology Kharagpur, West Bengal, India.

- **M.Sc. Thesis:** "*Diffusive Transport of Solutes Through Porous Medium for Different Interface Conditions*," under supervision of **Prof. G.P. Raja Sekhar**.

2011 – 2014 **B.Sc. in Mathematics**, Percentage: 81.00 %, Hooghly Mohsin College, University of Burdwan, West Bengal, India.

2009 – 2011 **Higher Secondary in Science Stream**, Percentage: 86.80 %, Bagati Ramgopal Ghosh Higher Secondary School, Hooghly, West Bengal, India.

2009 **Secondary Education**, Percentage: 82.25 %, Bishpara High School, Hooghly, West Bengal, India.

Research Interests

- Modeling and simulation of dynamic particulate processes.
- Development and analysis of numerical and semi-analytical schemes.
- Monte Carlo simulations of particulate processes and biological systems.
- Multi-scale discrete element method simulations of granulation processes.
- Use of population balances to model liquid metal refining and milk coagulation processes.

Academic Achievements

- Silver medalist (Department Topper) in Master of Science, from IIT Kharagpur, 2016.
- Secured All India rank 82 in Mathematics under Junior Research Fellowship (JRF) category, conducted by CSIR/UGC in NET 2015 (December).
- Secured All India rank 197 in GATE 2016 (Mathematics).
- Secured All India rank 146 in JAM 2014 (Mathematics).
- Recipient of the Institute research fellowship by IIT Kharagpur for pursuing Ph.D. (2016-2021).
- Recipient of the INSPIRE scholarship by the Department of Science and Technology (DST), India (2011-2016).
- Recipient of West Bengal government Merit-Cum-Means scholarship (2009-2011).
- Awarded the title of Amul Vidya Bhushan by Amul Sagar (Gujarat Cooperative Milk Marketing Federation Limited) for an outstanding academic performance at the state board Higher Secondary Examination held in 2011.

Journal Publications

- N. Yadav, Z. Ansari, R. Singh, **A. Das***, S. Singh, S. Heinrich, M. Singh, Explicit and approximate solutions for a classical hyperbolic fragmentation equation using a hybrid projected differential transform method, ***Physics of Fluids***, Vol- 36 (2024), Pages 093343 **(AIP Publishing, SCIE, Quartile: Q1, I.F. 2022: 4.1)**.
- **A. Das**, A. Maharana, J. Kumar, D. Sarkar*, Multivariate population balance modeling and simulation of ultrasound-assisted crystallization of a plate-type pharmaceutical: Nucleation, growth, and breakage, ***Computers & Chemical Engineering***, Vol- 184 (2024), Pages 108651 **(Elsevier, SCIE, Quartile: Q1, I.F. 2022: 4.3)**.
- S. Yadav, **A. Das***, S. Singh, S. Tomar, R. Singh, M. Singh, Coupled approach and its convergence analysis for aggregation and breakage models: Study of extended temporal behaviour, ***Powder Technology***, Vol- 440 (2024), Pages 119714 **(Elsevier, SCI, Quartile: Q1, I.F. 2022: 5.2)**.
- **A. Das***, J.S.K. Rabotin, T. Quatravaux, J.P. Bellot, Investigating chemical heterogeneity in inclusion population: A multi-variate population balance model study in gas-stirred ladles, ***Industrial & Engineering Chemistry Research***, Vol- 62, Issue- 48 (2023), Pages 20789-20801 **(ACS, SCIE, Quartile: Q1, I.F. 2022: 4.2)**.

- N. Yadav, **A. Das**, M. Singh*, S. Singh, J. Kumar, Homotopy perturbation method and its convergence analysis for nonlinear collisional fragmentation equations, ***Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences***, Vol- 479, Issue- 2279 (2023), Pages 01-20 **(Royal Society, SCIE, Quartile: Q1, I.F. 2022: 3.5)**.
- A. Maharana, P. Sehrawat, **A. Das**, J. Kumar, D. Sarkar*, Multi-dimensional population balance modeling of sonocrystallization of pyrazinamide with systematic estimation of kinetic parameters based on uncertainty and sensitivity analyses, ***Chemical Engineering Research and Design***, Vol- 200 (2023), Pages 356-373 **(Elsevier, SCIE, Quartile: Q2, I.F. 2022: 3.9)**.
- T. De, **A. Das***, M. Singh, J. Kumar, Enhancing efficiency in particle aggregation simulations: Coarse-grained particle modeling in the DEM-PBM coupled framework, ***Computer Methods in Applied Mechanics and Engineering***, Vol- 417 (2023), Pages 116436 **(Elsevier, SCI, Quartile: Q1, I.F. 2022: 7.2)**.
- **A. Das**, J. Paul, S. Heinrich, J. Kumar*, Development and analysis of moments preserving finite volume schemes for multi-variate nonlinear breakage model, ***Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences***, Vol- 479, Issue- 2271 (2023), Pages 01-26 **(Royal Society, SCIE, Quartile: Q1, I.F. 2021: 3.213)**.
- T. De, **A. Das***, J. Kumar, On the prediction of particle collision behavior in coarse-grained and resolved systems, ***Particulate Science and Technology*** Vol- 41, Issue- 8 (2023), Pages 1-15 **(Taylor & Francis, SCI, Quartile: Q2, I.F. 2021: 2.628)**.
- J. Paul*, **A. Das**, J. Kumar, Moments preserving finite volume approximations for the non-linear collisional fragmentation model, ***Applied Mathematics and Computation*** Vol- 436 (2023), Pages 127494 **(Elsevier, SCI, Quartile: Q1, I.F. 2021: 4.397)**.
- **A. Das**, T. De, G. Kaur, M. Dosta, S. Heinrich, J. Kumar*, An efficient multiscale bi-directional PBM-DEM coupling framework to simulate one-dimensional aggregation mechanisms, ***Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences***, Vol- 478, Issue- 2261 (2022), Pages 01-24 **(Royal Society, SCIE, Quartile: Q1, I.F. 2020: 2.704)**.
- **A. Das***, J. Kumar, Population balance modeling of volume and time dependent spray fluidized bed aggregation kernel using Monte Carlo simulation results, ***Applied Mathematical Modelling***, Vol- 92 (2021), Pages 748-769 **(Elsevier, SCIE, Quartile: Q1, I.F. 2020: 5.129)**.
- **A. Das**, S. Dutta, M. Sen, A. Saxena, J. Kumar, L. Giri, D.W. Murhammer, J. Chakraborty*, A detailed model and Monte Carlo simulation for predicting DIP genome length distribution in baculovirus infection of insect cells, ***Biotechnology and Bioengineering***, Vol- 118, Issue- 1 (2021), Pages 238-252 **(Wiley, SCI, Quartile: Q1, I.F. 2020: 4.530)**.
- A. Das*, S. Jash, S. Paul, Y.A. Mondal, **A. Das**, Optical chirped soliton structures in generalized derivative resonant nonlinear Schrödinger equation and modulational stability analysis, ***Optik***, Vol- 226 (2021), Pages 165701 **(Elsevier, SCI, Quartile: Q2, I.F. 2020: 2.443)**.

- **A. Das***, J. Kumar, M. Dosta, S. Heinrich, On the approximate solution and modeling of the kernel of nonlinear breakage population balance equation, ***SIAM Journal on Scientific Computing***, Vol- 42, Issue- 6 (2020), Pages B1570-B1598 **(SIAM, SCIE, Quartile: Q1, I.F. 2020: 2.373)**.
- **A. Das***, S. Bhoi, D. Sarkar, J. Kumar*, Sonofragmentation of rectangular plate-like crystals: Bivariate population balance modeling and experimental validation, ***Crystal Growth & Design***, Vol- 20, Issue- 8 (2020), Pages 5424-5434 **(ACS Publications, SCI, Quartile: Q1, I.F. 2020: 4.076)**.
- **A. Das**, A. Bück, J. Kumar*, Selection function in breakage processes: PBM and Monte Carlo modeling, ***Advanced Powder Technology***, Vol- 31, Issue- 4 (2020), Pages 1457-1469 **(Elsevier, SCIE, Quartile: Q1, I.F. 2020: 4.833)**.
- S. Bhoi, **A. Das**, J. Kumar, D. Sarkar*, Sonofragmentation of two-dimensional plate-like crystals: Experiments and Monte Carlo simulations, ***Chemical Engineering Science***, Vol- 203 (2019), Pages 12-27 **(Elsevier, SCIE, Quartile: Q1, I.F. 2020: 4.311)**.

Books & Chapters

- **Ashok Das**, Jitendra Kumar, Mathematical modeling of different breakage PBE kernels using Monte Carlo simulation results, ***Optimization of Pharmaceutical Processes*** (2022), Springer Publishers.

Teaching Experiences

IIT (ISM) Research Methodology, Operating Systems Lab, Engineering Mathematics - I, Preparatory Mathematics - I.

Oct 2023 **Substitute Teacher**, Discrete Mathematics- I, University of Limerick.

Jun–Oct 2021 **Teaching Assistant**, Engineering Mathematics- I, National Programme on Technology Enhanced Learning (NPTEL).

Jan–Apr 2019 **Teaching Assistant**, Engineering Mathematics- I, National Programme on Technology Enhanced Learning (NPTEL).

Jul 2018–Nov 2019 **Teaching Assistant (IIT Kharagpur):**, Advanced Numerical Techniques, Engineering Mathematics- I, Engineering Mathematics- II .

Invited Talks

May 31, 2024 **Workshop on Mathematical Modelling for Li-ion Batteries**, Department of Mathematics and Statistics, University of Limerick, Ireland.

Conferences Organized

Jun 28-30, 2024 **National Conference on Modeling, Analysis & Simulation (Comprising the Realms of AI, ML and IoT)**, *Department of Mathematics and Computing*, IIT (ISM) Dhanbad, India (**Joint Secretary**).

Conferences Attended

Aug 31 - Sept 1, 2023 **36th Annual Meeting of the Irish Mathematical Society**, University of Limerick, Limerick, Ireland.

Apr 2-7, 2023 **11th International Conference on Multiphase Flow (ICMF 2023)**, Kobe international conference center, Kobe, Japan.

Jun 28-29, 2022 **International Conference on Mathematical Analysis and Applications (ICOMAA 2022)**, Department of Mathematics, University of Kalyani, India.

Nov 21, 2020 **National Conference on Recent Trends in Science & Technology (RTST 2020)**, Department of Applied Sciences, MRIIRS, Faridabad, India.

Oct 12-15, 2020 **International Conference on Advances in Differential Equations and Numerical Analysis (ADENA)**, Department of Mathematics, IIT Guwahati, Guwahati, India.

Oct 28 - Nov 02, 2018 **2018 AIChE annual meeting**, David L. Lawrence Convention Center, Pittsburgh, USA.

Mar 20-21, 2018 **National Conference on Emerging Trends in Mathematics and its Applications (NCETMA)**, Department of Mathematics, Kazi Nazrul University, Asansol, India.

Workshops Attended

Feb 17, 2020 **Symposium on Computational Data Science and It's Applications**, IIT Kharagpur, West Bengal, India.

Feb 27, 2018 **Workshop on Scholarly Writing and Publishing**, IIT Kharagpur, West Bengal, India.

Dec, 2017 **National Training Programme in Scientific Computing with MATHEMATICA**, IIT (ISM) Dhanbad, India.

Aug 19-20, 2016 **Workshop on Mathematical Modelling and its Applications**, NIT Meghalaya, India.

Jan, 2014 **Training-cum-Workshop on C-Programming Under DBT Star College Programme**, Hooghly Mohsin College, West Bengal, India.

Computer Skills

- **Programming Languages:** C programming, FORTRAN
- **Softwares:** Matlab, Python, Mathematica, Maple, LIGGGHTS, Musen
- **Writting Applications:** Latex, MS Word, MS Powerpoint

Personal Information

Name	Ashok Das
Father's Name	Anil Das
Mother's Name	Manju Das
Address	143/150 Quarters, IIT (ISM) Dhanbad, Jharkhand- 826004, India
Date of Birth	2^{nd} February, 1994
Nationality	Indian
Gender	Male
Marital Status	Unmarried
Languages	Bengali (Mother tongue), English, Hindi
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