

Dr. Krishnendu Bhowmik

Assistant Professor

Dept. of Aerospace Engineering & Applied Mechanics (AE&AM)

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Higher education:

- PhD in Engineering, IEST Shibpur, 2022 (Thesis Title: *Experiments and Finite Element Study on Mechanical Strength of CNT Reinforced Hybrid Composite*)
- MSc (Engineering), Mechanical Engineering, IISc Bangalore, 2007 (Thesis Title: *Experimental and Finite Element Study of Elastic-Plastic Indentation of Rough Surfaces*)
- BE, Mechanical Engineering, IEST Shibpur, 2002

Major Employments:

- Assistant Professor, AE&AM Dept., IEST Shibpur, since October 2013 to Present
- Technology Specialist, ANSYS Software Pvt. Ltd., Bangalore, July 2012 – September 2013
- Aerospace Engineer, ATKINS India Pvt. Ltd., Bangalore, November 2009 – June 2012
- Mechanical Engineer, Safran Aerospace India Pvt. Ltd., Bangalore, August 2007 – October 2009

Major courses taught:

- Theory of Elasticity, Mechanics of Composite Materials, Aerospace Structures, Fracture Mechanics, Engineering Mechanics

Research interests:

- Composite Structures, CNT reinforced Nanocomposites, Mechanical Behavior of Materials, Finite Element Analysis

Research supervisions:

• PhD Student/s: 1 (Ongoing)

1. Arindam Saha (Reg. No. 2024AMPR002 dated 28 August 2024): *Modeling High-velocity Impact Behavior of Hybrid Composite*

• M. Tech. Thesis: 9 (Completed)

1. Devbrata Talukder (Reg. No. 2022AMM008): *Mechanical Strength of Fibre Reinforced Composite: A Parametric Study* (2024)
2. Sayan Roy (Reg. No. 321319018): *Delamination of Double Cantilever Composite Beam using Finite Element Analysis* (2021)
3. Pankaj Chauhan (Reg. No. 321318006): *Elastic Moduli of Defective Multi-Walled Carbon Nanotubes: A Finite Element Study* (2020)
4. Shamim Akhtar (Reg. No. 321317022): *Influence of Defects on Elastic Moduli of Graphene Sheets and Carbon Nanotubes using Finite Element Methods* (2019)
5. Rocky Kumar (Reg. No. 321317013): *A Finite Element Approach to Estimate the Flexural Rigidity of Hexagonal Honeycomb Sandwich Structures* (2019)
6. Pranav Kumar (Reg. No. 321316021): *Effective Young's Modulus of Wavy SWCNT Reinforced Nanocomposite: A Finite Element Study* (2018)
7. Jishan Ali (Reg. No. 320416028): *Finite Element Analysis of Among-Wind Response of RC Chimneys with Flexible-Base and Control by Liquid Damper* (Jointly Supervised with Prof. Aparna (Dey) Ghosh, Civil Engineering, 2018)
8. Raj Kumar Kalshyan (Reg. No. 321315013): *Finite Element Study of Laminated Composite Plate under In-Plane Concentrated Load* (2017)
9. Tuhin Nandy (Reg. No. 321314022): *Study of Effective Young's Modulus of Composite Materials* (2016)

• **B. Tech. Thesis: 9 (Completed)**

1. Gummula Mani Karthik, Bikram Mahato, Mohit Yadav, Gabu Dilleswara Reddy (Examination Roll Nos. 2020AMB012, 2020AMB014, 2020AMB017, 2020AMB044): *Transient Thermal Analysis of Internal Cooling Mechanism of a First Stage Turbine Blade* (2024)
2. Hela Ambati, Bojjireddy Raghunadh, Gopa Gayatri Vemakoti (Examination Roll Nos. 511318004, 511318035, 511318044): *Probing the Vibration Characteristics of Cracked and Porous Functionally Graded Beam* (Jointly Supervised with Dr. Apurba Das, 2022)
3. Divyanshu Aman (Examination Roll Nos. 511317034): *Estimation of Stress Concentration Factor for Finite-Width Orthotropic Rectangular Plate with a Central Circular Hole* (Jointly Supervised with Dr. Niloy Khutia, 2021)
4. Suraj Shrivastav, Subhadip Garai, Ghanshyam Shinde (Examination Roll Nos. 511317009, 511317011, 511317023): *Flight Dynamics Modelling and Simulation of Control System for Unmanned Aerial Vehicle* (Jointly Supervised with Dr. Niloy Khutia, 2021)
5. Souvik Atha, Shreya Sharma, Soham Saha (Examination Roll Nos. 511314016, 511314022, 511314024): *Static Analysis of Hyperelastic Tyre using Finite Element Analysis* (2018)
6. Hrishav Raj Singh, Bijoy Duari, Sudarshan Mandal (Examination Roll Nos. 111313019, 111313022, 111313011): *Finite Element Analysis of Typical Aircraft Structure* (Jointly Supervised with Dr. Amit Roy Chowdhury, 2017)
7. Aritra Kar, Sandeep Prakash, Gobinda Biswas, Satyen Mandal (Examination Roll Nos. 111313027, 111313017, 111313002, 111313014): *Stress Concentration Study of Rectangular Plates with Circular Holes using Finite Element Methods* (Jointly Supervised with Dr. Amit Roy Chowdhury, 2017)
8. Spandan Bandyopadhyaya (Examination Roll No. 111315027): *Finite Element Study of Square Thin Plate under Transverse Loading* (2017)
9. Buddhadeb Bhattacharyya, Koyel Bhowmik (Examination Roll Nos. 111115019, 111115005): *Design of Solar Unmanned Aerial Vehicle* (Jointly Supervised with Dr. Salil Haldar, 2015)

Recent publications:

International Journals:

- K. Bhowmik, N. Khutia, M. Tarfaoui, A. Basu, S. Akhtar, S. Dey, A. Roy Chowdhury, *Influence of CNT defects on the elastic modulus of nanocomposite: multiscale simulation*, J. Mater. Eng. Perform., 32:2356–2369 (2023) [Science Citation Index Expanded] <https://doi.org/10.1007/s11665-022-07287-1>
- K. Bhowmik, N. Khutia, M. Tarfaoui, M. Jana, K. Das, T. Roy, A. Bandyopadhyay, A. Roy Chowdhury, *Influence of Multiwalled Carbon Nanotube (MWCNT) on Progressive Damage of Epoxy/Carbon Fiber Reinforced Structural Composite*, Polym. Compos., 43:7751–7772 (2022) [Science Citation Index] <https://doi.org/10.1002/pc.26877>
- K. Bhowmik, T. Mukhopadhyay, M. Tarfaoui, N. Khutia, A. Roy Chowdhury, K. Lafdi, *Damage modeling of MWCNT reinforced Carbon/Epoxy composite using different failure criteria: A comparative Study*, Appl. Phys. A 128:549 (2022) [Science Citation Index] <https://doi.org/10.1007/s00339-022-05670-2>
- A. Banerjee, M.P. Khan, A. Barui, P. Datta, A. Roy Chowdhury, K. Bhowmik, *Finite Element Analysis of Influence of Cyclic Strain on Cells Anchored to Substrates with Varying Properties*, 60, 171–187, Med. Biol. Eng. Comput. (2022) [Science Citation Index] <https://doi.org/10.1007/s11517-021-02453-4>
- K. Bhowmik, S.K. Basantia, T. Roy, A. Bandyopadhyay, N. Khutia, A. Roy Chowdhury, *Mechanical properties of MWCNT reinforced epoxy nanocomposites: experimental, micromechanical and numerical study*, J. Inst. Eng. India Ser. D, 103:575–586 (2022) [Scopus] <https://doi.org/10.1007/s40033-022-00358-6>

Book Chapters:

- K. Bhowmik, H. Ambati, N. Khutia, A. Roy Chowdhury, *Prediction of Elastic Constants of Spiral MWCNT Reinforced Nanocomposites by Finite Element Analysis*, In: Maiti D.K. et al. (eds) Recent Advances in Computational and Experimental Mechanics, Vol-II, 37, 449–458, Lect. Notes Mech. Eng. (2022) [Scopus] https://doi.org/10.1007/978-981-16-6490-8_37
- P. Chauhan, K. Bhowmik, *Effect of Stone-wales defects on elastic moduli of Multi-walled Carbon Nanotubes using nanoscale continuum modeling*, In: Maity D. et al. (eds) Recent Advances in Computational and

Experimental Mechanics, Vol-I, 35, 425–434, Lect. Notes Mech. Eng. (2022) [Scopus]
https://doi.org/10.1007/978-981-16-6738-1_35

- K. Bhowmik, S. Akhtar, R. K. Kalshyan, N. Khutia, A. Roy Chowdhury, *CNT Reinforced Laminated Composite under In-Plane Tensile Loading: A Finite Element Study*, Mater. Sci. Forum, 978:323–329 (2020) [Scopus]
<https://doi.org/10.4028/www.scientific.net/msf.978.323>

Conference Papers:

- P. Chauhan, K. Bhowmik, *Estimation of Elastic moduli of defective Multi-walled Carbon Nanotubes by Finite Element Approach*, 64rd congress of ISTAM, December 09-12, 2019, IIT Bhubaneswar
- S. Roy, R. Kumar, K. Bhowmik, *A Study on Flexural Rigidity of Hexagonal Honeycomb Sandwich Structures using Finite Element Analysis*, 64rd congress of ISTAM, December 09-12, 2019, IIT Bhubaneswar
- M. P. Khan, K. Bhowmik, A. Barui and A. Roy Chowdhury, *Finite element modelling of cytoskeletal components under varying loads and elastic properties*, 63rd congress of ISTAM, December 20-23, 2018, Dayananda Sagar University, Bengaluru
- K. Bhowmik, S. Akhtar, N. Khutia, A. Roy Chowdhury, *Directional Young's Modulus of SWCNT Reinforced Nanocomposite by Finite Element Analysis*, 1st International Conference on Processing and Characterization of Materials (ICPCM–2018), December 08-10, 2018, NIT Rourkela, Odisha
- S. Datta, N. Dana, S. Bhagat, K. Bhowmik, A. Roy Chowdhury, *Achieving Desired Modulus by Varying Pore Parameters using Finite Element Analysis*, International Conference on Recent Innovations & Developments in Mechanical Engineering (IC-RIDME 2018), November 08-10, 2018, NIT Meghalaya, Shillong
- K. Bhowmik, T. Nandy, P. Kumar, N. Khutia, A. Roy Chowdhury, *Prediction of Directional Young's Modulus of Particulate Reinforced MMC using Finite Element Methods*, IOP Conf. Ser.: Mater. Sci. Eng., 377 012057 (2018) [Scopus] <https://doi.org/10.1088/1757-899X/377/1/012057>
- K. Bhowmik, P. Kumar, N. Khutia, A. Roy Chowdhury, *Estimation of Effective Directional Strength of Single Walled Wavy CNT Reinforced Nanocomposite*, IOP Conf. Ser.: Mater. Sci. Eng., 338 012016 (2018) [Scopus] <https://doi.org/10.1088/1757-899X/338/1/012016>
- K. Bhowmik, P. Kumar, N. Khutia, A. Roy Chowdhury, *Evaluation of Directional Strength of SWCNT Reinforced Nanocomposites: A Finite Element Study*, Mater. Today Proc., 5:20528–20534 (2018) [Scopus] <https://doi.org/10.1016/j.matpr.2018.06.430>

Conference/ Workshop/Seminar/Course work organized and attended:

- Participated as a *Session Chair*, International Conference on Mechanical Design and Manufacturing (1st ICMDM), Dept. of Mechanical Engineering, IEST Shibpur, April 27-28, 2023
- Participated short-term course on “*Atomistic Modelling of Solids: Theory & Applications*”, Dept. of Mechanical Engineering, IIT Indore, December 21-25, 2020
- Organized two days’ workshop as a coordinator on VSSC ISRO’S “*FEAST^{SMT} - Finite Element Analysis of Structures FEA Technology*”, AE&AM Dept., IEST Shibpur, August 01-02, 2019
- Presented a paper entitled *Evaluation of Directional Strength of SWCNT Reinforced Nanocomposites: A Finite Element Study*, ICMPC 2018, Dept. of Mechanical Engineering, GRIET, Hyderabad, March 16-18, 2018
- Presented a paper entitled *Prediction of Directional Young's Modulus of Particulate Reinforced MMC using Finite Element Methods*, ICMRE-2017, Dept. of Mechanical Engineering, SMIT, Sikkim, December 8-10, 2017
- Participated two days’ workshop on “*Biomechanics, Implants and Related Medical Devices*”, AE&AM Dept., IEST Shibpur, March 14-15, 2017
- Organized two days’ workshop as a co-coordinator on “*Astrodynamics and Aerospace Materials*”, AE&AM Dept., IEST Shibpur, August 10-11, 2016
- Attended two days’ workshop on “*Tribology Frontiers Workshop*” at IEST Shibpur, August 03-04, 2016.
- Attended two weeks workshop on “*Materials Characterization: Principles and Practices*”, Dept. of Metallurgy and Materials Engineering, IEST Shibpur, July 25 - August 05, 2016
- Attended one week course on “*Research Methodology*” at IEST Shibpur in November, 2014.

- Attended five days seminar on “*Foundation Skills in Integrated Product Development (FSIPD)*”, NASSCOM, Bengaluru, March 18-22, 2014
- Participated “*RC Aircraft Workshop*”, AE&AM Dept., BESU, Shibpur, 15th - 16th February 2014
- *Faculty in charge* on “*58th congress of ISTAM*”, AE&AM Dept., BESU, Shibpur, December 12-18, 2013
- Attended one day “*Workshop on Aeromodelling*”, AE&AM Dept., BESU, Shibpur jointly with The Aeronautical Society of India, Kolkata branch, November 8, 2013

Awards/Achievements:

- Best Paper Award for the paper entitled *Prediction of Directional Young's Modulus of Particulate Reinforced MMC using Finite Element Methods*, International Conference on Mechanical, Materials and Renewable Energy (ICMMRE 2017), December 08-10, 2017, SMIT, Sikkim

Membership of professional bodies:

- Life Member of The Aeronautical Society of India (M.AeSI): Membership Number: M-20574

Consultancy Projects Completed:

- *Impact Analysis of Away from Reactor Spent Fuel Facility at KKNPP 1&2*, Development Consultants Private Limited, Kolkata -700091, (2017-2018), Amount: 10 Lakh
- *Fan Vibration Analyses of cooling tower*, Paharpur Cooling Towers Limited, Kolkata -700 027 (2014 -2016), Amount: 0.75 Lakh

Personal Information:

Sex : Male

Marital Status : Married

Languages Known : English, Hindi and Bengali

Nationality : Indian

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