PRANESH ROY, Ph.D.
Assistant Professor
Department of Civil Engineering
Indian Institute of Technology (Indian School of Mines) (IIT-ISM) Dhanbad
Dhanbad, Jharkhand 826004, India
Phone: +91 9632140975
E-mail: pranesh@iitism.ac.in , roypranesh1990@gmail.com
Google Scholar , ResearchGate , Official webpage , Publons , Orcid , Scopus , LinkedIn

EDUCATION

Doctor of Philosophy (August 2014 – April 2019), Structural Engineering, Department of Civil Engineering, Indian Institute of Science (IISc), Bangalore, India.
Research Advisor: Prof. Debasish Roy
Thesis Title: Non-classical Continuum Models for Solids using Peridynamics and Gauge theory

Master of Technology (July 2012 – July 2014), Structural Engineering, Department of Civil Engineering, Indian Institute of Technology (IIT), Delhi, India.
Research Advisors: Prof. A.K. Nagpal and Prof. Vasant Matsagar
Thesis Title: Seismic Evaluation of Chamera Dam for Scenario Earthquake

Bachelor of Engineering (Hons.) (August 2008 – June 2012), Department of Civil Engineering, Jadavpur University, Kolkata, West Bengal, India.

EXPERIENCE

Assistant Professor - Grade I (June 2023 - Present)
Department of Civil Engineering, Indian Institute of Technology (Indian School of Mines) (IIT-ISM) Dhanbad

Assistant Professor - Grade II (June 2021 - June 2023)
Department of Civil Engineering, Indian Institute of Technology (Indian School of Mines) (IIT-ISM) Dhanbad

Postdoctoral Research Associate (July 2019 – June 2021)
Aerospace and Mechanical Engineering, The University of Arizona, USA.
Research Advisor: Prof. Erdogan Madenci

IISc Research Associate (December 2018 – June 2019)
Structural Engineering, Department of Civil Engineering, Indian Institute of Science (IISc), Bangalore, India.
Research Advisor: Prof. Debasish Roy

PUBLICATIONS

Refereed Articles

21 Sajal, & **Roy, P.** (2025). "Peridynamics Modeling of Locally Resonant Metamaterials", *Journal of Peridynamics and Nonlocal Modeling*, Springer, 7 (3). https://doi.org/10.1007/s42102-025-00127-5

20 Ranjana, K.N., Sajal, & **Roy, P.** (2025), "Riemannian geometry based peridynamics computational homogenization method for cellular metamaterials", *Computer Methods in Applied Mechanics and Engineering*, Elsevier, 436, 117714. https://doi.org/10.1016/j.cma.2024.117714

19 Sajal, & **Roy, P.** (2025). "Peridynamics model of torsion-warping: Application to lattice beam structures", *Thin-Walled Structures*, Elsevier, 206, Part A, 112603. https://doi.org/10.1016/j.tws.2024.112603

18 Mahadeshwar, V., Sajal, & **Roy, P.** (2024), "Finite deformation peridynamics shell theory: Application to mechanical metasurfaces", *Thin-Walled Structures*, Elsevier, 205, Part B, 112401. https://doi.org/10.1016/j.tws.2024.112401

17 Kumar, A., Sajal, & **Roy, P.** (2024), "Peridynamics contact model: Application to healing using phase field theory", *International Journal of Mechanical Sciences*, Elsevier, 280, 109553. https://doi.org/10.1016/j.ijmecsci.2024.109553

16 Sajal, & **Roy, P.** (2024), "Finite deformation micropolar peridynamic theory: Variational consistency of wryness measure", *International Journal of Mechanical Sciences*, Elsevier, 271, 109306. https://doi.org/10.1016/j.ijmecsci.2024.109306

15 Behera, D., **Roy, P.**, & Madenci, E. (2024), "Peridynamic simulation of creep deformation and damage", *Continuum Mechanics and Thermodynamics*, Springer. https://doi.org/10.1007/s00161-024-01295-3

14 **Roy, P.**, Behera, D., & Madenci, E. (2023), "Peridynamic modeling of elastic instability and failure in lattice beam structures", *Computer Methods in Applied Mechanics and Engineering*, Elsevier, 415, 116210. https://doi.org/10.1016/j.cma.2023.116210

13 Sajal, & **Roy, P.** (2023), "Peridynamics modeling of cellular elastomeric metamaterials: Application to wave isolation", *International Journal of Mechanical Sciences*, Elsevier, 254, 108456. https://doi.org/10.1016/j.ijmecsci.2023.108456

12 Behera, D., **Roy, P.**, Anicode, S. V. K., Madenci, E., & Spencer, B. (2022), "Imposition of local boundary conditions in peridynamics without a fictitious layer and unphysical stress concentrations", *Computer Methods in Applied Mechanics and Engineering*, Elsevier, 393, 114734. https://doi.org/10.1016/j.cma.2022.114734

11 Behera, D., **Roy, P.**, & Madenci, E. (2021), "Peridynamic modeling of bonded-lap joints with viscoelastic adhesives in the presence of finite deformation", *Computer Methods in Applied Mechanics and Engineering*, Elsevier, 374, 113584. https://doi.org/10.1016/j.cma.2020.113584

10 **Roy, P.**, Behera, D., & Madenci, E. (2020), "Peridynamic Simulation of Finite Elastic Deformation and Rupture in Polymers", *Engineering Fracture Mechanics*, Elsevier, 236, 107226. https://doi.org/10.1016/j.engfracmech.2020.107226

9 Behera, D., **Roy, P.**, & Madenci, E. (2020), "Peridynamic Correspondence Model for Finite Elastic Deformation and Rupture in Neo-Hookean Materials", *International Journal of Non-Linear Mechanics*, Elsevier, 126, 103564. https://doi.org/10.1016/j.ijnonlinmec.2020.103564

8 **Roy, P.**, Kumar, S., & Roy, D. (2020), "Cauchy–Maxwell Equations: A Space–Time Conformal Gauge Theory for Coupled Electromagnetism and Elasticity", *International Journal of Non-Linear Mechanics*, Elsevier, 126, 103542. https://doi.org/10.1016/j.ijnonlinmec.2020.103542

7 **Roy, P.**, Roy, D., & Reddy, J. N. (2019), "A Conformal Gauge Theory of Solids: Insights into a Class of Electromechanical and Magnetomechanical Phenomena", *Journal of the Mechanics and Physics of Solids*, Elsevier, *130*, 35-55. https://doi.org/10.1016/j.jmps.2019.05.008

6 **Roy, P.**, & Roy, D. (2019), "Peridynamics Model for Flexoelectricity and Damage", *Applied Mathematical Modelling*, Elsevier, *68*, 82-112. https://doi.org/10.1016/j.apm.2018.11.013

5 Chowdhury, S. R., **Roy, P.**, Roy, D., & Reddy, J. N. (2019), "A Modified Peridynamics Correspondence Principle: Removal of Zero-energy Deformation and Other Implications", *Computer Methods in Applied Mechanics and Engineering*, Elsevier, *346*, 530-549. https://doi.org/10.1016/j.cma.2018.11.025

4 **Roy, P.**, Deepu, S. P., Pathrikar, A., Roy, D., & Reddy, J. N. (2017), "Phase Field based Peridynamics Damage Model for Delamination of Composite Structures", *Composite Structures*, Elsevier, 180, 972-993. https://doi.org/10.1016/j.compstruct.2017.08.071

3 **Roy, P.**, Pathrikar, A., Deepu, S. P., & Roy, D. (2017), "Peridynamics Damage Model through Phase Field Theory", *International Journal of Mechanical Sciences*, Elsevier, 128, 181-193. https://doi.org/10.1016/j.ijmecsci.2017.04.016

2 Rahaman, M. M., **Roy, P.**, Roy, D., & Reddy, J. N. (2017), "A Peridynamic Model for Plasticity: Micro-inertia based Flow Rule, Entropy Equivalence and Localization Residuals", *Computer Methods in Applied Mechanics and Engineering*, Elsevier, 327, 369-391. https://doi.org/10.1016/j.cma.2017.07.034

1 Chowdhury, S. R., **Roy, P.**, Roy, D., & Reddy, J. N. (2016), "A Peridynamic Theory for Linear Elastic Shells", *International Journal of Solids and Structures*, Elsevier, 84, 110-132. https://doi.org/10.1016/j.ijsolstr.2016.01.019

IMPACT FACTORS OF THE JOURNALS

No. of Papers (**21**)	Journal	Impact Factor
1	Journal of the Mechanics and Physics of Solids	**5.0**
6	Computer Methods in Applied Mechanics and Engineering	**6.9**
4	International Journal of Mechanical Sciences	**7.1**
2	Thin-Walled Structures	**5.7**
1	Applied Mathematical Modelling	**4.4**
1	Composite Structures	**6.3**
1	International Journal of Solids and Structures	**3.4**
1	Engineering Fracture Mechanics	**4.7**
2	International Journal of Nonlinear Mechanics	**2.8**
1	Continuum Mechanics and Thermodynamics	**1.9**
1	Journal of Peridynamics and Nonlocal Modeling	**-**

BOOK

Madenci, E., **Roy, P.**, & Behera D. (2022), "Advances in Peridynamics" (Springer, eBook ISBN 978-3-030-97858-7, Print ISBN 978-3-030-97857-0) https://link.springer.com/book/10.1007/978-3-030-97858-7 Amazon (India) , Amazon (USA)

BOOK CHAPTERS

3 Roy P., Behera D., Madenci E., Oterkus S. (2022) Peridynamic Modeling of Thermo-oxidative Degradation in Polymers. In: van Driel W.D., Yazdan Mehr M. (eds) Reliability of Organic Compounds in Microelectronics and Optoelectronics. Springer, Cham. https://doi.org/10.1007/978-3-030-81576-9_4

2 Roy, P., Pathrikar, A., & Roy, D., "Phase Field based Peridynamics Damage Model: Application to Delamination of Composite Structures and Inelastic Response of Ceramics", *Peridynamic Modeling, Numerical Techniques, and Applications, 1st Edition*, Editors: Erkan Oterkus, Selda Oterkus, & Erdogan Madenci, Elsevier, 1st May 2021, Paperback ISBN: 9780128200698. https://doi.org/10.1016/B978-0-12-820069-8.00004-4

1 Roy, P., Pathrikar, A., & Roy, D., **"**Peridynamics Damage Model through Phase Field Theory", *Peridynamic Modeling, Numerical Techniques, and Applications, 1st Edition*, Editors: Erkan Oterkus, Selda Oterkus, & Erdogan Madenci, Elsevier, 1st May 2021, Paperback ISBN: 9780128200698. 10.1016/B978-0-12-820069-8.00007-X

R&D PROJECTS

Externally funded

Title of the Project: Design of mechanical metasurfaces for wave isolation applications by developing a large deformation peridynamics shell model
Funding organization: Defense Research & Development Organisation (Aeronautics R&D Board)
Principal Investigator: Dr. Pranesh Roy, IIT (ISM) Dhanbad
Co-Principal Investigator: Dr. Rahul Bhartiya, IIT (ISM) Dhanbad
Sanctioned fund: 25,38,266 Rs.
Duration: 2025-2028

Institute funded

Title of the Project: Peridynamic modelling of finite deformation and failure of additively manufactured lattice structures
Funding organization: IIT (ISM) Dhanbad, Faculty Research Scheme
Principal Investigator: Dr. Pranesh Roy
Sanctioned fund: 14,50,000 Rs.
Duration: 2022-2025

KEYNOTE ADDRESS

1 Roy, P., "Nonclassical Continuum Models for Solids", Technical Session - 01, International Conference on Systems, Energy and Environment (ICSEE2022) at Government College of Engineering (GCE), Kannur, August 5, 2022, Kerala, India. (Online mode)

SESSION CHAIR

1 8th International Congress on Computational Mechanics & Simulation (ICCMS), IIT Indore, December 9-11, 2022, India (Chaired 2 technical sessions)

INVITED TALKS

1 Title of the talk: Peridynamics modeling of damage, wave propagation, and contact-impact problems. (Presented in online mode on 09.07.2024). Program: EDP program from 8-12 July 2024 at IIIF Kolkata on "Blast Resilience of Civil Infrastructures: Emerging Global Trends".

CONFERENCE PAPERS AND PRESENTATIONS

2 Sajal, & **Roy, P.**, "A finite deformation micropolar peridynamic theory and its application to metamaterials", 16th World Congress on Computational Mechanics and 4th Pan American Congress on Computational Mechanics (WCCM 2024 / PANACM 2024), 21-26 July 2024, Vancouver, Canada. https://doi.org/10.23967/c.wccm.2024.067

(My Ph.D. student Mr. Sajal received DST-SERB ITS Travel Grant from the Department of Science and Technology (DST) for presenting this work)

1 Behera, D., **Roy, P.**, Madenci, E., & Oterkus, S. (2021, June). Prediction of thermal oxidation damage in polymers by using peridynamics. In 2021 IEEE 71st Electronic Components and Technology Conference (ECTC) (pp. 1457-1463). IEEE. 10.1109/ECTC32696.2021.00232

CONFERENCE PRESENTATIONS

8 Sajal, & **Roy, P.**, "Peridynamics Simulation of Wave Isolation in Metamaterials", 9th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2024), 3rd - 7th June 2024, Lisbon, Portugal (ID: 356).

7 Sajal, & **Roy, P.**, "Study of wave propagation in polymers in the presence of local elastic instability and rupture using peridynamics", 8th International Congress on Computational Mechanics & Simulation (ICCMS), IIT Indore, December 9-11, 2022, India (Reference Id: ICCMS21_1657817514). (**Presenting author**)

6 Behera, D., **Roy, P.**, Madenci, E., & Spencer, B., 2021, "An Approach to Impose Boundary Conditions in Peridynamics: Removal of Displacement Kinks Without a Fictitious Layer", ASME 2021 International Mechanical Engineering Congress and Exposition, Virtual Conference, IMECE2021-71883.

5 Behera, D., **Roy, P.**, and Madenci, E., 2021, "Recent progress in peridynamic theory", 2nd International Workshop on Plasticity, Damage and Fracture of Engineering Materials, Ankara, Turkey.

4 Madenci, E., Behera, D., and **Roy, P.**, 2021, "Recent progress in peridynamic theory", The International Workshop of Discrete Models, (Virtual), Brazil.

3 Madenci, E., **Roy P.**, & Behera, D., "Peridynamics Implementation of Liu Murakami Creep Damage Model in Moose Framework", IMECE2020-25220, *ASME's International Mechanical Engineering Congress and Exposition (IMECE)*, Virtual Conference: November 16 – 19, 2020.

2 **Roy, P.**, & Roy, D., "A Peridynamics Theory for Axisymmetric Structures", *19th International Conference on New Trends in Fatigue and Fracture*, October 8-10, 2019, Tucson, Arizona, USA. (**Presenting author**)

1 **Roy, P.**, & Roy, D., "Phase Field based Peridynamics Damage Model and Applications to Composite Delamination and Damage in Ceramics", IMECE2017-72950, *ASME's International Mechanical Engineering Congress and Exposition (IMECE)*, November 3-9, 2017, Tampa, Florida, USA. (**Presenting author**)

WORKSHOP ORGANIZED

1 Organized a Two-Day Workshop as co-coordinator on "Recent Advancements and Best Practices in Civil Engineering with Emphasis on Application of High-Strength Reinforcement Bars in Concrete Construction", sponsored by TATA TISCON on 3rd and 4th Jan 2025 and delivered a lecture on "Direct Stiffness Method".

GUEST LECTURES ORGANIZED

2 "CFD Modeling of Supercritical Narrow Channel Flows using OpenFOAM" by Mr. Subhojit Kadia on 12.04.2024 in the Civil Engineering Department, IIT (ISM) Dhanbad.

1 "An Inference Framework to Transfer Thermo-Elastic Properties of Short Fiber-Reinforced Polymers across Different Extrusion Deposition Additive Manufacturing Systems" by Dr. Gourab Ghosh on 24.04.2023 (online mode) in the Civil Engineering Department, IIT (ISM) Dhanbad.

SCHOLASTIC ACHIEVEMENTS

2 Ministry of Human Resources and Development (MHRD) scholarship during the course of Ph.D.
1 Ministry of Human Resources and Development (MHRD) scholarship during the course of M.Tech.

PARTICIPATIONS IN SHORT-TERM TRAINING PROGRAMS

2 Attended the vocational training from June 2, 2011 to June 28, 2011 in Bengal Unitech – Uniworld City Project Site, Rajarhat, Kolkata, provided by "*Simplex Infrastructures Limited*".

1 Attended and successfully completed the part time course on "Computer Aided Design & Drafting using AUTOCAD/AUTOLISP" from June 21, 2010 to October 06, 2010 provided by "*Department of Electronics and Accreditation of Computer Classes (DOEACC SOCIETY)*", Kolkata Centre.

COMPUTATIONAL SKILLS

Programming Languages: FORTRAN, MATLAB, C, C++, Mathematica
Softwares: ABAQUS, STAAD, SAP

TEACHING EXPERIENCE

Course Instructor (January 2024 - May 2024), IIT (ISM) Dhanbad
Course: **Optimization Methods (CEO525)** (B. Tech. 7th Semester)
Lab: **Computational Laboratory (NCEC512)** (M. Tech. 1st year)

Course Instructor (August 2024 - December 2024), IIT (ISM) Dhanbad
Course: **Mechanics of Solid (CEE201)** (B. Tech. 3rd Semester) (jointly with a Mechanical Department faculty member)
Course: **Computational Solid Mechanics (CED501)** (B. Tech. 7th Semester)
Lab: **Engineering Graphics Practical (CEI101)** (B.Tech. 1st Semester)

Course Instructor (January 2024 - May 2024), IIT (ISM) Dhanbad
Course: **Optimization Methods (CEO525)** (B. Tech. 7th Semester)

Course Instructor (August 2023 - December 2023), IIT (ISM) Dhanbad
Course: **Mechanics of Solid (CEE201)** (B. Tech. 3rd Semester) (jointly with a Mechanical Department faculty member)
Course: **Computational Solid Mechanics (CED501)** (B. Tech. 7th Semester)
Lab: **Engineering Graphics Practical (CEI101)** (B.Tech. 1st Semester)

Course Instructor (June 2023 - July 2023), IIT (ISM) Dhanbad
Course: **Optimization Methods (CEO525)** (B. Tech. 7th Semester) (jointly with a Civil Department faculty member)

Course Instructor (January 2023 - May 2023), IIT (ISM) Dhanbad
Course: **Optimization Methods (CEO525)** (B. Tech. 7th Semester)
Lab: **Engineering Graphics Practical (CEI101)** (B.Tech. 2nd Semester)

Course Instructor (August 2022 - December 2022), IIT (ISM) Dhanbad
Course: **Mechanics of Solid (CEE201)** (B. Tech. 3rd Semester) (jointly with a Mechanical Department faculty member)
Course: **Computational Solid Mechanics (CED501)** (B. Tech. 7th Semester)
Lab: **Engineering Graphics Practical (CEI101)** (B.Tech. 1st Semester)

Course Instructor (January 2022 - May 2022), IIT (ISM) Dhanbad
Course: **Structural Dynamics (CEO404)** (B. Tech. 6th Semester)
Lab: **Finite Element Method Lab (CEC18201)** (B. Tech. 8th Semester)
Lab: **Engineering Graphics Practical (CEI101)** (B.Tech. 2nd Semester)

Course Instructor (August 2021 - December 2021), IIT (ISM) Dhanbad
Course: **Mechanics of Solid (CEE201)** (B. Tech. 3rd Semester) (jointly with a Mechanical Department faculty member)
Course: **Optimization Methods (CEO302)** (B. Tech. 5th Semester)

Teaching Assistant (August 2016 - December 2016)
Structural Engineering, Indian Institute of Science (IISc), Bangalore, India.
Course: **Solid Mechanics (CE-204)**

Teaching Assistant (January 2013 - April 2013)
Structural Engineering, Indian Institute of Technology (IIT), Delhi, India.
Course: **Design of Steel Structures (CEL332)**

COURSE DEVELOPED

Computational Solid Mechanics (CED501)

ADMINISTRATIVE RESPONSIBILITIES

Present
Member, Standing Appellate Committee (SAC), All India Council for Technical Education (AICTE)
Team Member, NBA, Civil Engineering, IIT (ISM) Dhanbad
Faculty in-charge, Computational Lab, Civil Engineering, IIT (ISM) Dhanbad
Faculty in-charge, Structural Analysis Lab, Civil Engineering, IIT (ISM) Dhanbad
Faculty coordinator (from Civil Engineering Department), International Relations, IIT (ISM) Dhanbad
DPGC member, Civil Engineering, IIT (ISM) Dhanbad
DGRC member, Civil Engineering, IIT (ISM) Dhanbad

Previous
Timetable member, Civil Engineering, IIT (ISM) Dhanbad
Designed extension of old-D-type quarters at IIT (ISM) Dhanbad (along with faculty colleagues and junior technician)

STUDENTS

Ph.D. students
Ongoing
1. Mr. Sajal (Prime Minister's Research Fellow)
2. Ms. Kumari Neelam Ranjana
3. Mr. Nilesh Choudhary
4. Ms. Beauty Dey
5. Mr. Anirban Mondal

M.Tech. students
Ongoing
1. Mr. Kundan Kumar
2. Mr. Bhushan Sah
3. Mr. Abhijeet Kumar
4. Mr. Anshul Sharma

Completed
1. Ms. Vaibhavi Sandip Mahadeshwar (2023-2024)
2. Mr. Ankit Kumar (2023-2024)
3. Mr. Amit Kumar (2022-2023)

B.Tech. students
Ongoing
Mr. Girish Shivkumar Reure
Mr. Krish Sahu

Completed
1. Mr. Souhardya Samanta (2023-2024)
2. Ms. Keshar Lahare (2023-2024)
3. Mr. Ishaan Singh (2022-2023)
4. Mr. Khusiram Meena (2022-2023)

Summer interns
Completed
1. Mr. Satyaki Maity (May-July, 2022)

Short-term visiting scholars
1. Mr. Subrata Mondal (Ph.D. student of NIT Andhra Pradesh)