Sukanta Chakraborty, Phd, ASCE

Associate Professor
Department of Civil Engineering
Ph: +91-326-223-5194; Email:sukanta@iitism.ac.in

Research Interests

- Computational Mechanics
- Impact Dynamics
- Damage and Fracture of Materials
- Composite Constitutive Modelling
- Mesh-less Numerical Techniques

Education

- **Ph.D** Indian Institute of Technology Kharagpur, INDIA
  Thesis Topic: Mesh-less Framework for Brittle and Ductile Failure Behaviour under Projectile Impact
- **M.Tech** Indian Institute of Technology Roorkee, INDIA
  (Recipient of Trust Prize from Indian Service of Engineers)
  Dissertation Topic: Influence of Soil-Structure Interaction on Fatigue Damage of Steel Railway Truss Bridges
- **BE** Bengal Engineering and Science University Shibpur, INDIA

Experience

Research

- Associate Professor at Department of Civil Engineering (Jul 2024-till date), Indian Institute of Technology (ISM), Dhanbad, INDIA
- Assistant Professor at Department of Civil Engineering (June 2015-June 2014), Indian Institute of Technology (ISM), Dhanbad, INDIA
- Assistant Professor at Department of Civil Engineering (March 2015-May 2015), National Institute of Technology Sikkim, INDIA
- Research Assistant for DRDO project (July 2014 – February 2015),Indian Institute of Technology Kharagpur, INDIA

Teaching

- **UG Level Theory**
  At IIT (ISM) Dhanbad: Structural Analysis, Solid Mechanics, CAD for Civil Engineering, Engineering Graphics
- **UG Level Laboratory**
  Engineering Graphics, Solid Mechanics, Design of Concrete Structures
- **PG level Theory**
  Elasticity and Plasticity, Advanced Design of Structures, Finite Element Method, Theory of Plates and Shells
- **PG level Laboratory**
  CAD Laboratory, Structural Analysis laboratory

Thesis/Dissertation Supervision

- Ph. D. Supervision:
    1. Dr. A. Sahu: (Jointly with Dr. T. Dey) "Sustainable Development of Concrete using Recycled Coarse and Fine Aggregates."
    2. Dr. S. Sarkar: (Jointly with Dr. S. Nayak) "Low velocity impact performance of concrete and composite sub-structural members using ANN based application with optimal FEA generated data."
    3. Dr. A. Bharadwaj: "A numerical framework for damage assessment of RC structure considering three-phase mesoscopic heterogeneity under quasi-static and impact loading."
    4. Mr. M. Sharma: 2019-Ongoing
    5. Mr. Mujahid Alam: 2022-Ongoing
    6. Mr. Deepak Kumar Das: 2023-ongoing
    7. Mr. Rohit Raj: 2024-ongoing
    8. Mr. Dabeer Answer Danish: 2024-Ongoing

- MTech Project Supervision:
  Completed: 17
  Ongoing: 02

Publications

- **Journal**

Sarkar S, **Chakraborty S** and Nayak S. "Identification of optimum reinforcement detailing using tuned CDP parameters in RC beam under drop-weight impact." *Engineering Failure Analysis,* 146, (2024), pp. 107116.

Khan D, and **Chakraborty S**. "Axisymmetric model for Taylor impact test and estimation of metal plasticity using nonlinear deformation profile." *Journal of the Brazilian Society of Mechanical Sciences and Engineering*, 45(3), (2023), pp. 128.

Bharadwaj A and **Chakraborty S**. "Numerical investigation on effect of randomized mesoscopic heterogeneity in stochastically located arbitrary shaped aggregates in impact response of reinforced concrete." *Engineering Failure Analysis,* 141, (2022), pp. 106691.

Sahu A, **Chakraborty S** and Dey T. "Performance evaluation of sustainable recycled aggregate concrete with colloidal nano-silica." *European Journal of Environmental and Civil Engineering*, 26(15), (2022), pp. 7878-7898.

Sahu A, Dey T and **Chakraborty S.** "Influence of nano silica on mechanical and durability characteristic of mortar made by partial replacement with recycled fine aggregate." *Silicon*, 13, (2021), pp. 4391-4405.

Islam MRI, **Chakraborty S**, Shaw A. "On Consistency and Energy Conservation in Smoothed Particle Hydrodynamics." *International Journal for Numerical methods in Engineering,* 116(9), (2018), pp. 601-632.

Islam MRI, **Chakraborty S**, Shaw A, Reid S."A computational model for failure of ductile material under impact." *International Journal of Impact Engineering*, 108, (2017), pp. 334-347.

Chakraborty S, Islam MRI, Shaw A, Ramachandra LS, Reid SR."A computational framework for modelling impact induced damage in ceramic and ceramic-metal composite structures. "*Composite Structures*, 164, (2017), pp. 263-276.

Sahu A, Dey T and **Chakraborty S.** "Study on the Interfacial Transition Zones of Recycled Aggregate Concrete." *Indian Journal of Science and Technology*, 9-47 (2016), pp. 1-6.

Chakraborty S and Shaw A. "Prognosis for Ballistic Sensitivity of Pre-Notch in Metallic Beam through Mesh-less Computation Reflecting Material Damage."*International Journal of Solids and Structure,* 67-68 (2015), pp. 192-204.

Chakraborty S, Shaw A and Banerjee, B. "An axisymmetric model for Taylor impact test and estimation of metal plasticity." *Proceedings of the Royal Society A,* 471(2015),doi = 10.1098/rspa.2014.0556.

Shaw A, Reid SR, Roy D and **Chakraborty S**. "Beyond classical dynamic structural plasticity using mesh-free modelling techniques." *International Journal of Impact Engineering*, 75 (2015), pp. 268 – 278.

Chakraborty S and Shaw A. "Crack Propagation in Bi-material System via Pseudo-Spring Smoothed Particle Hydrodynamics." *International Journal for Computational Methods in Engineering Science and Mechanics,* 15-3 (2014), 294-301.

Chakraborty S and Shaw A. "A pseudo-spring based fracture model for SPH simulation of impact dynamics." *International Journal of Impact Engineering*, 58 (2013), pp. 84 – 95.

- **<u>Conferences</u>**

Bharadwaj A and **Chakraborty S** (2020), "A numerical approach to model heterogeneity of concrete in RC beam subjected to impact loading." *1st Online International Conference on Recent Advances in Computational and Experimental Mechanics 2020* (ICRACEM), Kharagpur – INDIA, 4-6 September 2020.

Sarkar S, Lama A, **Chakraborty S** and Nayak S (2019), "Effect of Drop Weight and Drop Height on Impact Behaviour of Reinforced Concrete Beam." 7th*International Congress on Computational Mechanics and Simulation* (ICCMS2019), Mandi - INDIA, 11-13 December 2019.

Jain V, Kumar R and **Chakarbarty S** (2019), "Non-linear Dynamic Response and Dynamic Buckling of Isotropic Imperfect Thin Plates." *International conference on nonlinear solid mechanics* (ICoNSoM2019), Roma-Italy, 20-23 June 2019.

Chakraborty S and Dey T. (2017) **"**Mesh-less simulation of crack propagation in Functionally Graded Materials (FGM) subjected to impact loading." *20th International Conference on Composite Structures* (ICCS20), Paris-France, 4-7 September 2017.

Dey T and **Chakraborty S**. (2017) **"**Dynamic instability analysis of FGM cylindrical shell panels subjected to parabolic edge loading and thermal environment." *20th International Conference on Composite Structures* (ICCS20), Paris-France, 4-7 September 2017.

Sahu A, Dey T and **Chakraborty S**. (2016), "Study on the Interfacial Transition Zones of recycled aggregate concrete." *2nd International Conference on Sustainable Energy and Built Environment* (organized by ASCE-ICES), Vellore – INDIA, 10-12 March, 2016.

Rusdie MI**, Chakraborty S** and Shaw A. (2014) "Evaluation of metal plasticity by optimization on mathematical model of Taylor impact test." *Structural Engineering Convention* (SEC), IIT Delhi - INDIA, 22-24 December 2014.

Rusdie MI**, Chakraborty S** and Shaw A. (2014) "Numerical simulation of adiabatic shear plugging." 5th*International Congress on Computational Mechanics and Simulation* (ICCMS),Chennai - INDIA, 10-13 December 2014.

Chakraborty S and Shaw A. (2014) "Numerical Modelling of Dynamic Crack Growth past an Inclusion." *International Conference on Computational & Experimental Engineering and Sciences*(ICCES'14), Changwon, Korea, June 12 - 17, 2014.

Chakraborty S and Shaw A. (2012) "Damage in Brittle Solids via Pseudo-Spring Smoothed Particle Hydrodynamics." 4th*International Congress on Computational Mechanics and Simulation* (ICCMS), IIT Hyderabad - INDIA, 10-12 December 2012.

Chakraborty S, Mondal SB, Guchhait S and Pandey AD. (2010) "Influence of Train Speed on Fatigue characteristics of a Steel Girder Railway Bridge." *14th Symposium on Earthquake Engineering* (SEE), IIT Roorkee -INDIA, 17-19 December 2010.

Chakraborty S and Pandey AD. (2010) "Soil-Structure interaction effects on fatigue life of a long span Railway steel truss bridge." *14th Symposium on Earthquake Engineering* (SEE), IIT Roorkee - INDIA, 17-19 December 2010.

- **Invited Talk**

"Concrete heterogeneity in impact load simulation" at Emerging Trends in Numerical and Experimental Techniques in Structural Engineering, 15th Jan 2025, at NIT Rourkela.

"Performance of concrete in aggressive Environment – Deterioration, Diagnosis and Remedies" at Development of Cement Technology for Sustainable Infrastructure, 24th Feb 2019, Sponsored by Dalmia Cements at IIT (ISM) Dhanbad

"Fatigue characteristics of steel railway truss bridges", at Advances In Structural & Geotechnical Engineering (ASGE) 8th Jun 2018, at IIT (ISM) Dhanbad.

"Concrete in aggressive Environment" at Advances in Civil Engg. (ACE), 8th Apr 2018, Sponsored by DST (INDIA) at IIT (ISM) Dhanbad

"Influence of SSI on fatigue characteristics of steel railway truss bridges", at 3-Weeks UGC Sponsored Refresher Course on "Recent Advances in Civil Engineering" 06th Jan, 2018, Jadavpur University, India

- **Attended Workshops**

"Design of Experiments and Statistical Modelling" organised by SQC & OR unit of Indian Statistical Institute Hyderabad and NIT Sikkim, 25-28 Mar, 2015 at NIT Sikkim.

"National Seminar on Housing and Disaster Mitigation in India: Case Studies (HDME-09)" organised by Centre of Excellence in Disaster Mitigation and Management, IIT Roorkee, 18 Apr, 2009 at IIT Roorkee.

R&D Projects

Research work and funding from external agencies

Sl. No.	Name of all PI/Co-PI etc.	Sponsoring Authority	Topic/ Field	Sanctioned Amount(Rs.)
1.	PI: **S. Chakraborty**	DST-SERB	Dynamic Crack Kinking from Aggregate-Mortar Interface of Concrete Sub-Structural System	28,70,450/-
2.	PI: S.K. Panda, Co-PI: T. Dey, **S. Chakraborty** and Ramachandra L.S.	SPARC-MHRD	Nonlinear vibrations and instability analysis of composite structural elements through advanced shear-deformation theories and homogenization based damage model.	49,91,220/-
3.	PI: S.K. Das, Co-PI: S. Nayak, **S. Chakraborty** and R. Sarkar	DST	Funding of Improvement of S&T Infrastructure (FIST)-Level 1	2,20,00,000/-

4.	PI: **S. Chakraborty**	DST-SERB	Assessing tsunami vulnerability of low-rise structures by SPH modelling	29,74,400/-

Apart from these, Institute level FRS project (sanctioned amount of Rs 10.15Lakhs) and TEQUIP-III minor project (sanctioned amount of Rs 2.0Lakhs) are completed.

Consultancy work details (Completed/Ongoing):

	Sponsoring Authority
As PI	BSEC-SGRL (JV); ECR; ECL;
As Co-PI	DW & S Circle, Dhanbad; NHAI; BPCL; BCCL; AECOM Asia Company Limited; NBCC (India) Ltd., New Delhi; M/s Wapcos Limited; MECON Limited; JRDA Dhanbad, DVC; CPWD Dhanbad; Indu Projects Ltd. Hyderabad; Sunil Hi-tech Engineers Ltd;

Conferences (as Organizing Committee Member)

- Sustainable Infrastructure. 8 – 10 Jan., 2016 at IIT (ISM), Dhanbad
- Advance in Civil engineering (ACE) 6th-8th April, 2018 at IIT (ISM), Dhanbad
- Advance in Structural & Geotechnical Engineering (ASGE) 5 – 9 June, 2018 at IIT (ISM), Dhanbad

Professional Affiliations

- American Society of Civil Engineering – Member (ID: 10786945)
- Indian Society of Earthquake Technology – Life Member
- Institute of Engineers (India) – Member

Administrative Responsibilities

FIC Departmental Computational facility (Nov' 16-Sept' 19)
Member - Centre for Blasting Technology and Research
DUGC- convenor (Oct' 22-Oct' 24)
DPGC member (Oct' 24- till date)
VP (faculty)-Civil Engineering Society (Sept, 19-till now)

Member of assessment team for structural safety of existing infrastructure at IIT (ISM) Dhanbad as and when directed by competent authority.