

Bankim Chandra Mandal

Curriculum Vitae



About me

Associate Professor,
School of Basic Sciences,
IIT Bhubaneswar, India

Office Address

SBS-340, IIT Bhubaneswar,
Khurda, Odisha-752050

Areas of specialization

Numerical Analysis • Partial
Differential Equation • Domain
Decomposition Methods
• Scientific Computing

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SHORT RESUMÉ

2024–present	Associate Professor • IIT Bhubaneswar 	
2017–2024	Assistant Professor • IIT Bhubaneswar 	
2016–2017	Research Associate • Michigan State University, USA  Supervisor: Prof. Andrew Christlieb	
2015–2016	Post-doctoral Research Fellow • Michigan Technological University, USA  Supervisor: Prof. Benjamin Ong	

PROFESSIONAL TRAINING

2010–2014	Ph.D. Scholar • University of Geneva, Switzerland  Supervisor: Prof. Martin J. Gander Thesis Title: Convergence Analysis of Substructuring Waveform Relaxation Methods for Space-time Problems and Their Application to Optimal Control Problems	
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EDUCATION

2010	M.Sc. CGPI: 8.66/10 • IIT Bombay 
2008	B.Sc.(Honours) 90.12% • RK Mission Vidyamandira, Belur Math 
2005	10+2 80.90% • WBCHSE, West Bengal 
2003	10th 85.25% • WBBSE, West Bengal 

RESEARCH GUIDANCE

Ph.D.	2 – Completed – Post-doc in Prague 2 – Continuing
M.Sc.	17 – 2 in Ph.D. in Europe – 3 in TCS – 2 in Banking
B.Tech.	1 – Ph.D. in UCLA, USA
Internship	2 – Ph.D. in LSU, USA

RESEARCH GRANTS

2019–2022	Start-up Research Grant (SRG) SERB-DST • Completed  Topic: Space-time Domain Decomposition Methods for Non-linear Cahn-Hilliard Equation and Their Implementations in Parallel Computers	
2019–2021	SEED Fund IIT BHUBANESWAR • Completed  Topic: Domain Decomposition Methods for Non-linear Problems	

Languages		
Bangali	C2	native
English	C2	
Hindi	B2	
Odia	A1	

Interests

Dramatics • Movie-making
• Cooking • Parenting
• Travel • Photography

TEACHING HIGHLIGHTS

2026	Spring Numerical Linear Algebra (M.Sc) – 11 students Math. & Quant. Reasoning (ITEP) – 47 students	Autumn
2025	Spring ODE (M.Sc) – 22 students (Feedback: 0.87/1) PDE (M.Sc) – 21 students (Feedback: 0.77/1)	Autumn ODE (M.Sc) – 21 students (Feedback: 0.79/1) NSOPDE (M.Sc & Ph.D) – 25 students (Feedback: 0.80/1)
2024	Spring ODE (M.Sc) – 21 students (Feedback: 4.43/5)	Autumn Numerical Linear Algebra (M.Sc) – 16 students (Feedback: 0.81/1) PDS LAB (M.Sc) – 22 students
2023	Spring PDE (M.Sc) – 21 students (Feedback: 4.71/5) Math-II (B.Tech) – 118 students (Feedback: 4.28/5)	Autumn Numerical Techniques (B.Tech) Numerical Methods (B.Tech) – 115 students (Feedback: 3.94/5)
2022	Spring PDEs (M.Sc & B.Tech) – 122 students (Feedback: 3.81/5)	Autumn Numerical Linear Algebra (M.Sc) – 12 students (Feedback: 4.77/5) Mathematical Methods (M.Tech) – 41 students (Feedback: 4.04/5)
2021	Spring PDEs (M.Sc) – 21 students (Feedback: 4.42/5) Numerical Techniques (B.Tech) – 91 students (Feedback: 4.09/5)	Autumn Mathematical Methods (M.Tech) – 66 students (Feedback: 4.32/5) Mathematics-I (B.Tech) – 103 students (Feedback: 4.12/5)
2020	Spring Numerical Analysis LAB (M.Sc) – 21 students (Feedback: 4.33/5) Numerical Techniques (B.Tech) – 83 students (Feedback: 4.07/5)	Autumn Mathematical Methods (M.Tech) – 57 students (Feedback: 4.27/5) Mathematics-I (B.Tech) – 97 students (Feedback: 4.36/5)
2019	Spring ODEs (M.Sc) – 21 students (Feedback: 4.56/5) PDEs (M.Sc) – 19 students (Feedback: 4.07/5)	Autumn Mathematical Methods (M.Tech) – 71 students (Feedback: 3.64/5) Mathematics-I (B.Tech) – 105 students (Feedback: 4.22/5)
2018	Spring PDEs (M.Sc) – 17 students (Feedback: 4.17/5) Mathematics-II (B.Tech) – 173 students (Feedback: 4.18/5)	Autumn Optimization Tech. LAB (M.Sc) – 21 students (Feedback: 4.44/5) Mathematics-I (B.Tech) – 185 students (Feedback: 4.19/5)
2017	Autumn Mathematics-I (B.Tech) – 86 students (Feedback: 4.25/5) Optimization Techniques (M.Sc) – 17 students (Feedback: 4.47/5) Optimization Tech. LAB (M.Sc) – 17 students (Feedback: 4.49/5)	2016 Fall  Michigan State University Calculus-II – 34 students

MAJOR ACADEMIC ACHIEVEMENTS

- 2020** Best Presentation Award in M3HPCST, held in IPEC, New Delhi.
- 2019** Excellence in Teaching Award in IIT Bhubaneswar.
- 2017** Best Paper Award in SocProS 2017, held in IIT Bhubaneswar.
- 2010** All India Rank-3 in CSIR-NET (June) and All India Rank-12 in GATE in Mathematics.
- 2009-2010** Merit Scholarship by National Board of Higher Mathematics (NBHM) during M.Sc. in IIT Bombay.
- 2009** Student Research Fellowship by Indian Academy of Sciences (IAS) for doing a summer internship in IIT Madras.
- 2008** Gold medallist in B.Sc. for obtaining Highest marks in Mathematics (Hons.) in Calcutta University.

Extra-academic Duty

2024-	Faculty Advisor (Sports), Gymkhana
2023	Coordinator, G20 Open House (Maths)
'22-'24	Computational LAB Coordinator
2022-	SDPC Member, Mathematics
2022	Member, Staff Shortlisting Committee (SO, A-Sports-O, PTI, APRO, A-Security-O)
2021-	Nodal Officer, FIT India
2020	Chairman, E-Summit 2020 JAM Scrutinizing Committee (Maths) Center Coordinator for IITBBS, Madhava Mathematics Competition 2020
'19-'23	EAA Co-coordinator
2019	Faculty-in-Charge, Inter IIT Sports Meet JAM Scrutinizing Committee (Maths) Faculty Advisor (M.Sc Maths) Faculty Placement Coordinator (Maths) Computational LAB Coordinator
2018	Coordinator, Open Day Exhibition (Maths)

PUBLICATIONS

Journal Articles

- [1] *Dirichlet-Neumann and Neumann-Neumann Waveform Relaxation Algorithms for Parabolic Problems*; with M. Gander and F. Kwok, Electronic Transactions on Numerical Analysis, Vol. 45, 2016. Q₂ IF : 1.26
- [2] *Neumann-Neumann Waveform Relaxation Algorithm in Multiple Subdomains for Hyperbolic Problems in 1D and 2D*; Numerical Methods for Partial Differential Equations, Vol. 33(2), 2017. Q₁ IF : 1.7
- [3] *Pipeline Implementations of Neumann-Neumann and Dirichlet-Neumann Waveform Relaxation Methods*; with BW Ong, Numerical Algorithms, Vol. 78(1), 2018. Q₁ IF : 2.2
- [4] *Dirichlet-Neumann waveform relaxation methods for parabolic and hyperbolic problems in multiple subdomains*; with M. Gander and F. Kwok, BIT Numerical Mathematics, Vol. 61, 2021. Q₁ IF : 1.9
- [5] *Convergence of substructuring methods for the Cahn-Hilliard equation*; with G. Garai, Communications in Nonlinear Science and Numerical Simulation, Vol. 120, 2023. Q₁ IF : 3.8
- [6] *Dirichlet-Neumann and Neumann-Neumann Waveform Relaxation Algorithms for Heterogeneous Sub-diffusion and Diffusion-wave Equations*; with S. Sana, Computers & Mathematics with Applications, 2023. Q₁ IF : 2.5
- [7] *Linear and Nonlinear Dirichlet-Neumann Method in Multiple Subdomains for the Cahn-Hilliard Equation*; with G. Garai, International Journal of Computer Mathematics, 2023. Q₂ IF : 1.7
- [8] *Diagonalization Based Parallel-in-Time Method for a Class of Fourth Order Time Dependent PDEs*; with G. Garai, Mathematics and Computers in Simulation, <https://doi.org/10.1016/j.matcom.2023.07.028>, 2024. Q₁ IF : 4.4
- [9] *On the Convergence of Overlapping and Non-overlapping Schwarz Methods for the Cahn-Hilliard Equation*; with G. Garai, J. Comput. Sci., 2023. Q₂ IF : 3.5
- [10] *Integrating Factor Based Time Integrators for the Cahn-Hilliard Equation*; with G. Garai, Mathematical Methods in the Applied Sciences, 2024. Q₁ IF : 1.8
- [11] *On the Convergence of Linear and Nonlinear Parareal Methods for the Cahn-Hilliard Equation*; with G. Garai, Communications in Nonlinear Science and Numerical Simulation, Vol. 134, 2024. Q₁ IF : 3.8
- [12] *Convergence Analysis of the Dirichlet-Neumann Waveform Relaxation Algorithm for Time Fractional Sub-Diffusion and Diffusion-Wave Equations in Heterogeneous Media*; with S. Sana, Advances in Computational Mathematics, 2024. Q₁ IF : 2.1
- [13] *Dirichlet-Neumann and Neumann-Neumann Waveform Relaxation Methods for PDEs with Time Delay*; with D. Tomer, IMA J. Appl. Math., 2025. Q₂ IF : 1.2
- [14] *Domain Decomposition based Space-time Preconditioner for the Optimal Control Problems with Constraints Imposed by the Cahn-Hilliard Equation*; with G. Garai, International Journal of Computer Mathematics, 2025. Q₂ IF : 1.7
- [15] *Discretization Strategies for Optimal Control of the Cahn-Hilliard Equation*; with G. Garai, Applicable Analysis, 2026. Q₂ IF : 1.2

References

Prof. Martin J. Gander

University of Geneva, Switzerland

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Dr. Felix Kwok

Université Laval, Canada

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Dr. Benjamin W. Ong

Michigan Technological University, USA

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Dr. S. Baskar

IIT Bombay, India

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- [16] *One-level and Two-level Domain Decomposition based Preconditioners for the Cahn-Hilliard Equation*; with G. Garai, Journal of Applied Mathematics and Mechanics, 2026. Q_2 IF : 3.2
- [17] *Space-time Domain Decomposition Methods for the Cahn-Hilliard equation*; with G. Garai, Calcolo, 2026. Q_2 IF : 1.4
- [18] *Convergence of Substructuring Waveform Relaxation Algorithms for Hyperbolic PDEs with Time Delay*; with D. Tomer, Computational and Applied Mathematics, 2026. Q_2 IF : 2.3

Under Review

- [19] *Optimal Control of a Sub-diffusion Model using Dirichlet-Neumann and Neumann-Neumann Waveform Relaxation Algorithms*; with S. Sana, under Review, 2025.
- [20] *Domain Decomposition Based Fast Solver for Laplace Equation on Complex Geometries via Rational Functions*; with Kishore U., under Review, 2026.
- [21] *Dirichlet-Neumann Waveform Relaxation Methods for Hyperbolic PDE with Time Delay in Multiple Subdomain*; with D. Tomer, under Review, 2026.
- [22] *A Space-time Domain Decomposition Method on Diffusion Problem with Time Delay with Generalized Non-Standard Finite Difference Scheme on Two-Sided Graded Meshes*; with Devank and D. Tomer, under Review, 2026.

Book Chapters

- [1] *Convergence of Substructuring Methods for Elliptic Optimal Control Problems*, with M. Gander and F. Kwok, Domain Decomposition Methods in Science and Engineering XXIV, LNCSE, Vol. 125, Springer-Verlag, 2018.
- [2] *Substructuring waveform relaxation methods for parabolic optimal control problems*; AISC, Vol. 817, Springer, 2019.
- [3] *Convergence of Substructuring Domain Decomposition Methods for Hamilton-Jacobi Equation*; Trends in Mathematics, Birkhäuser, 2021.
- [4] *Graded mesh in Optimal Control of Subdiffusive models and its significance in Neumann-Neumann Waveform Relaxation Algorithm*; with S. Sana, Domain Decomposition Methods in Science and Engineering XXIX, LNCSE, Springer-Verlag, 2026.
- [5] *Domain Decomposition Based Waveform Relaxation Methods for Hyperbolic Problems*; with D. Tomer, Multiscale Problems: Recent Advancements in Numerical Analysis and Scientific Machine Learning, Springer, 2026.

Conference Proceedings

- [1] *A Time-Dependent Dirichlet-Neumann Method for the Heat Equation*, Domain Decomposition Methods in Science and Engineering XXI, LNCSE, Vol. 98, Springer-Verlag, 2014.
- [2] *Dirichlet-Neumann and Neumann-Neumann Waveform Relaxation for the Wave Equation*; with M. Gander and F. Kwok, Domain Decomposition Methods in Science and Engineering XXII, LNCSE, Vol. 104, Springer-Verlag, 2015.
- [3] *Substructuring Waveform Relaxation Methods with Time Dependent Relaxation Parameter*; with S. Sana, AISC, Springer, Vol. 1262, 2021.
- [4] *Parareal Algorithms for the Cahn-Hilliard Equation*; with G. Garai, Domain Decomposition Methods in Science and Engineering XXVII, LNCSE, Springer-Verlag, 2023.
- [5] *Convergence of Neumann-Neumann Waveform Relaxation Algorithm with Time-dependent Relaxation Parameter for Time fractional Sub-diffusion and Diffusion-wave Problems*; with S. Sana, Domain Decomposition Methods in Science and Engineering XXVIII, LNCSE, Springer-Verlag, 2025.
- [6] *Convergence of Dirichlet-Neumann Waveform Relaxation Algorithm for PDEs with Time-delay in Multiple Subdomains*; with D. Tomer, Domain Decomposition Methods in Science and Engineering XXIX, LNCSE, Springer-Verlag, 2026.

SCIENTIFIC ACTIVITIES

- * Poster: Presented a poster at the Swiss Numerics Colloquium 2011, USI, Lugano, Switzerland.
- * Talk: DNWR for the time Dependent Heat Equation; April '12, Swiss Numerical Colloquium, Bern, Switzerland.
- * Talk: DNWR for the time Dependent Heat Equation; June '12, 21st International Domain Decomposition Methods Conference, INRIA, Rennes, France.
- * Talk: DNWR for the Time-Dependent Problems; September 1-6 '13, Domain Decomposition Methods for Optimization with PDE Constraints, Ascona, Switzerland.

- * Poster: Presented a poster at the Swiss Numerics Colloquium 2013, EPF Lausanne, Switzerland.
- * Poster: Presented a poster at the CADMOS Activity Days 2013, Leysin, Switzerland.
- * Talk: Substructuring Waveform Relaxation Methods for the Wave Equation; September 16-20 '13, 22nd International Domain Decomposition Methods Conference, USI, Lugano, Switzerland.
- * Talk: Convergence of Substructuring Methods for Optimal Control Problems with PDE Constraints; April '14, Swiss Numerical Colloquium, Zurich, Switzerland.
- * Talk: Convergence Behavior of DNWR and NNWR methods for Space-time PDEs and Their Application to Optimal Control Problems; April '15, Applied Mathematics Seminar, Michigan Technological University, USA.
- ☆ Invited Talk: Domain Decomposition Methods for Hamilton-Jacobi Equations; October '15, Applied Mathematics Seminar, Department of Mathematical Sciences, Michigan State University, USA.
- * Talk: Domain Decomposition methods for Optimal Control Problems, December '17, SocProS 2017, IIT Bhubaneswar.
- ☆ Invited Talk: Convergence of Substructuring Waveform Relaxation Methods for Multiple Subdomains and Their Numerical Treatment; August '18, International Workshop on High Performance Numerical Methods for PDEs, Northeast Normal University, China.
- * Talk: Convergence of Substructuring Domain Decomposition Methods for Hamilton Jacobi Equation, February '20, M3HPCST, Inderprastha Engineering College, New Delhi.
- ☆ Invited Talk: Substructuring-based Methods for Elliptic and Parabolic Optimal Control Problems; September '22, Research School on Domain Decomposition for Optimal Control Problems, CIRM, Marseille, France.
- ☆ Invited Talk: Domain Decomposition Methods for Linearized and Non-Linear Cahn-Hilliard Equation; December '23, Ramanujan Math. Soc. Conference, IIT Guwahati.
- * Talk: Solving Optimal Control Problems with Cahn-Hilliard as Constraint using DD-based Preconditioners; February '24, 28th International DDM Conference, KAUST, Saudi Arabia.
- ☆ Invited Talks: Trends in Numerical Linear Algebra; November '24, IMA Silver Jubilee Workshop, Bhubaneswar.
- * Talk: Optimal Control Problems with Diffusion-wave Equation as Constraint; June '25, 29th International DDM Conference, Milan, Italy.
- * Talk: Domain Decomposition Methods for PDEs with Time Delay; June '25, 29th International DDM Conference, Milan, Italy.
- ☆ Invited Talk: Domain Decomposition Methods for Time Fraction PDEs; August '25, AMSE Conference, SOA University.

EXTRACURRICULAR ACTIVITIES

- 🏠 Cultural Secretary (Mathematics Department) for the session 2009–2010.
- 🏠 Received Excellence Award in Annual Drama Competition in R.K.Mission Vidyamandira, Belur Math in 2008.
- 🏠 Winner in the short film-making competition in IIT Bombay, 2009.
- 🏠 Received 2nd Prize in Inter-school Parliamentary drama competition in school, 2002.
- 🏠 National Cadet Corps (NCC) at R.K.Mission Vidyamandira, Belur Math under 23 Bengal BN NCC Branch and NCC B–Certificate holder.
- 🏠 Done Bratachari (A Cultural Training) in high school and Bratachari certificate holder.