

curriculum vitae

# Projesh Nath Choudhury

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## ACADEMIC POSITIONS AND EMPLOYMENT

*Aug 2022 – present:* Assistant Professor, Department of Mathematics, Indian Institute of Technology Gandhinagar, India.

*Mar 2022 – Aug 2022:* C. V. Raman Postdoctoral Fellow, Department of Mathematics, Indian Institute of Science, Bengaluru, India (Mentor: Prof. Apoorva Khare).

*Apr 2020 – Feb 2022:* SERB National Postdoctoral Fellow, Department of Mathematics, Indian Institute of Science, Bengaluru, India (Mentor: Prof. Apoorva Khare).

*Aug 2018 – Mar 2020:* NBHM Postdoctoral Fellow, Department of Mathematics, Indian Institute of Science, Bengaluru, India (Mentor: Prof. Apoorva Khare).

*Jan 2018 – Jul 2018:* Institute Postdoctoral Fellow, Department of Mathematics, Indian Institute of Technology Madras, Chennai, India (Mentor: Prof. K.C. Sivakumar).

## EDUCATION

- *2014–2018:* Ph.D. in Mathematics, Indian Institute of Technology Madras, Chennai, Tamil Nadu, India.  
Thesis Title: Contributions to Positivity Classes of Matrices.  
Thesis Defended on: May 14, 2018.  
Thesis Advisor: Prof. K. C. Sivakumar.
- *2011–2013:* M.Sc. in Mathematics & Computing, Indian Institute of Technology Guwahati, Guwahati, Assam, India.
- *2008–2011:* B.Sc. (Mathematics Hons.), Gurucharan College, Silchar, Assam, India.

## SHORT ACADEMIC VISITS

*Jul 24 – 28, 2023:* American Institute of Mathematics, Pasadena, USA:

One of ~10 participants from outside North America, invited (with full funding) to participate in the AIM Workshop “*Theory and applications of total positivity*”

*Jul 12 – Jul 23, 2023:* University of Regina, Canada (Host: Prof. S.M. Fallat).

*Jan 31 – Feb 10, 2020:* Indian Institute of Technology Kharagpur, India (Host: Dr. M. R. Kannan).

*Dec 27, 2019 – Jan 10, 2020:* Indian Statistical Institute, Delhi centre, India (Host: Prof. R.B. Bapat).

*Dec 16 – Dec 22, 2019:* Indian Institute of Technology Madras, India (Host: Prof. K.C. Sivakumar).

## ACADEMIC ACHIEVEMENTS AND FELLOWSHIPS

- *2023*: Subhash Bhatt Award, from the Indian Mathematical Society during their 89th annual meeting in Hyderabad.
- *2022*: Inspire Faculty Fellowship award 2021.
- *2022*: ILAS-LAA Early Career Speaker Award.
- *2022*: Awarded C. V. Raman Postdoctoral Fellowship (IISc).
- *2019*: Awarded SERB National Post Doctoral Fellowship (SERB-NPDF).
- *2018*: Awarded National Board for Higher Mathematics (NBHM) Post doctoral fellowship.
- *2017*: Institute Research Award, IIT Madras, India.
- *2016*: Qualified CSIR-UGC Net in Mathematics.
- *2013*: Qualified Graduate Aptitude Test in Engineering (GATE) in Mathematics.
- *2012–2013*: Awarded Chief Minister’s Scholarship for Meritorious Students of Assam, awarded by Government of Assam, India.
- *2011–2013*: Awarded Post-Graduate Merit Scholarship for University Rank Holder awarded by University Grants Commission (UGC), India.
- *2011*: Secured first Position in the B.Sc. (Mathematics Hons.) examination of Assam University, Silchar, Assam, India.

## RESEARCH AREAS

Matrix theory, in connection with positivity and combinatorics.

## PUBLICATIONS

### Published/accepted:

1. Projesh Nath Choudhury and Shivangi Yadav, *Sign regular matrices and variation diminution: single-vector tests and characterizations, following Schoenberg, Gantmacher–Krein, and Motzkin*, Proceedings of the American Mathematical Society, in press.
2. Projesh Nath Choudhury and Apoorva Khare, *The blowup-polynomial of a metric space: connections to stable polynomials, graphs and their distance spectra*, Canadian Journal of Mathematics (42 pp.), published online.
3. Projesh Nath Choudhury and Apoorva Khare, *Distance matrices of a tree: two more invariants, and in a unified framework*, European Journal of Combinatorics, **115** (2024), Article #103787, 30 pp.
4. Projesh Nath Choudhury and Raju Nandi, *Quadratic embedding constants of graphs: Bounds and distance spectra*, Linear Algebra and Its Applications, **680** (2024), 108–125.
5. Projesh Nath Choudhury, *Total negativity: characterizations and single-vector tests*, Bulletin des Sciences Mathématiques, **186** (2023), Article #103284, 21 pp.
6. Projesh Nath Choudhury and Apoorva Khare, *Blowup polynomials and delta-matroids of graphs*, Séminaire Lotharingien de Combinatoire, **86B** (2022), Article #42, 12 pp. (Selected for Talk at FPSAC-2022.)

7. Projesh Nath Choudhury, *Characterizing total positivity: single vector tests via Linear Complementarity, sign non-reversal, and variation diminution*, Bulletin of the London Mathematical Society, **54** (2022), 791–811.
8. Projesh Nath Choudhury and K.C. Sivakumar, *Nesbitt and Shapiro Cyclic Sum Inequalities for Positive Definite Matrices*, Advances in Operator Theory, **7** (2022), Paper no. 7.
9. Projesh Nath Choudhury, M. Rajesh Kannan and Apoorva Khare, *Sign non-reversal property for totally non-negative and totally positive matrices, and testing total positivity of their interval hull*, Bulletin of the London Mathematical Society, **53** (2021), 981–990.
10. Projesh Nath Choudhury and M. Rajesh Kannan, *Interval hulls of  $N$ -matrices and almost  $P$ -matrices*, Linear Algebra and Its Applications, **617** (2021), 27–38.
11. Projesh Nath Choudhury, N. Eagambaram, K.C. Sivakumar and P. Sushmitha, *On the matrix class  $Q_0$  and inverse monotonicity properties of bordered matrices*, Linear Algebra and Its Applications, **612** (2021), 206–222.
12. Projesh Nath Choudhury and K.C. Sivakumar, *Matrices with positive semidefinite real part*, Linear and Multilinear Algebra, **69** (2021), 448–470.
13. Projesh Nath Choudhury and Michael J. Tsatsomeros, *Algorithmic Detection and Construction of  $N$ -matrices*, Linear Algebra and Its Applications, **602** (2020), 46–56.
14. Projesh Nath Choudhury, M. Rajesh Kannan and K.C. Sivakumar, *A note on linear preservers on semipositive and minimal semipositive matrices*, Electronic Journal of Linear Algebra, **34** (2018), 687–694.
15. Projesh Nath Choudhury, M. Rajesh Kannan and K.C. Sivakumar, *New contributions to semipositive and minimally semipositive matrices*, Electronic Journal of Linear Algebra, **34** (2018), 35–53.
16. Projesh Nath Choudhury and K.C. Sivakumar, *An extension of a matrix inequality of Thompson*, Linear Algebra and Its Applications, **535** (2017), 151–159.
17. Projesh Nath Choudhury and K.C. Sivakumar, *Trace inequalities for positive semidefinite matrices*, Discussiones Mathematicae - General Algebra and Applications, **37** (2017), 93–104.
18. Projesh Nath Choudhury and K.C. Sivakumar, *Tucker’s theorem for almost skew-symmetric matrices and a proof of Farkas’ lemma*, Linear Algebra and Its Applications, **482** (2015), 55–69.
19. Ar. Meenakshi, Projesh Nath Choudhury and K.C. Sivakumar, *Almost definite matrices revisited*, Electronic Journal of Linear Algebra, **29** (2015), 102–119.

## Submitted:

20. Projesh Nath Choudhury and Shivangi Yadav, *Sign regularity preserving Linear operators* (2024), arXiv: math.FA/2408.02428.
21. Projesh Nath Choudhury and Apoorva Khare, *The additive-multiplicative distance matrix of a graph, and a novel third invariant* (2023), arXiv: math.CO/2309.08691.
22. Projesh Nath Choudhury and Apoorva Khare, *Multivariate blowup-polynomials of graphs* (2021), arXiv: math.CO/2106.03751.

## REFEREE / REVIEWER

- SIAM Journal on Discrete Mathematics
- Linear Algebra and its Applications
- IEEE Transactions on Automatic Control
- Linear and Multilinear Algebra
- Proceedings - Mathematical Sciences
- São Paulo Journal of Mathematical Sciences
- Indian Journal of Pure and Applied Mathematics
- Electronic Journal of Linear Algebra
- Journal of the Indian Mathematical Society
- Operators and Matrices
- Turkish Journal of Mathematics
- Involve - a journal of Mathematics
- Applied Mathematics E-Notes
- Special Matrices
- American Mathematical Society(AMS) Mathematical Reviews.

## CONFERENCE AND WORKSHOP ORGANIZATION

- *Mar 06–11, 2023*: Workshop on Operator Theory and Operator Algebra, supported by the NCM, IIT Gandhinagar.  
Co-organizer: Bipul Saurabh (IIT Gandhinagar).
- *Jun 20–24, 2022*: Invited Mini-symposium on Distance matrices of graphs, International Linear Algebra Society (ILAS) Meeting, National University of Ireland, Galway.  
Co-organizer: Apoorva Khare (IISc, Bengaluru).

## TALKS

- Mar 14, 2024*: Celebration of International Day of Mathematics, Assam University, Silchar.
- Mar 14, 2024*: Pi-Day celebration, Pandit Deendayal Energy University, Gandhinagar.
- Dec 24, 2023*: 89th Annual Conference of the Indian Mathematical Society, BITS Pilani at Hyderabad-Subhash Bhatt Award Lecture.
- Dec 22, 2023*: 38th Annual Conference of the Ramanujan Mathematical Society, Indian Institute of Technology Guwahati.
- Jul 14, 2023*: University of Regina, Canada: **Colloquium**.
- Mar 6–8, 2023*: National Centre for Mathematics Workshop on Operator Theory and Operator Algebra, Indian Institute of Technology Gandhinagar.
- Dec 22, 2022*: National Mathematics Day Program, Babasaheb Bhimrao Ambedkar University, Lucknow.

*Nov 7, 2022:* Indian Institute of Technology Gandhinagar: GANIT seminar.

*Jul 21, 2022:* 34th International Conference on Formal Power Series & Algebraic Combinatorics (FPSAC) (a satellite of the 2022-ICM), IISc Bangalore, India.

*Jun 21, 2022:* 23rd International Linear Algebra Society Meeting, ILAS 2022, National University of Ireland, Galway- LAA early career speaker.

*Dec 10, 2021:* Indian Institute of Technology Kharagpur: Seminar on graphs, matrices and applications.

*Jul 21, 2021:* Applied Matrix Positivity, ICMS Edinburgh, Scotland.

*Feb 05, 2021:* University of Maryland, Baltimore County, USA: Optimization Seminar.

*Feb 28, 2020:* Indian Institute of Science Education and Research Kolkata: DMS seminar.

*Feb 7, 2020:* Indian Institute of Technology Kharagpur: **Colloquium**.

*Jan 8, 2020:* Indian Statistical Institute at Delhi: SMUD seminar.

*Dec 26, 2019:* Conference on Linear Algebra and its Applications (In honour of R.B. Bapat 65th Birthday), Indian Statistical Institute at Delhi.

*Oct 21, 2019:* Indian Institute of Technology Bombay: Combinatorics seminar.

*Aug 1, 2019:* Indian Statistical Institute at Bangalore: **Colloquium**.

*Mar 28, 2019:* In-house Symposium, Indian Institute of Science Bangalore.

*Jun 22, 2018:* International Conference on Analysis and Applications, Indian Institute of Technology Madras.

*Dec 12, 2017:* International Conference on Linear Algebra and its Applications, Manipal University (Contributed).

*Nov 10, 2017:* In-house Symposium, Indian Institute of Technology Madras.

*Jul 26, 2017:* 21st International Linear Algebra Society Meeting, ILAS 2017, Iowa State University, USA (Contributed).

*Jun 10, 2016:* Workshop and Conference on Game Theory and Optimization, Indian Institute of Technology Madras, India.