M. Rajesh Kannan

Present address

Assistant Professor (from July 2016),
Department of Mathematics,
Indian Institute of Technology Kharagpur,
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ACADEMIC QUALIFICATIONS

B.Sc. Mathematics, Anja College, Sivakasi, Tamil Nadu, 2005.

M.Sc. Mathematics, Anja College, Sivakasi, Tamil Nadu, 2008.

Ph.D Mathematics, Indian Institute of Technology Madras, Chennai, Tamil Nadu, 2013. (Supervisors : Prof KC Sivakumar and Prof P Veeramani)

RESEARCH AREA

Algebraic and Spectral Graph Theory, Matrix Theory, Combinatorics.

RESEARCH EXPERIENCE

November 2015 - June 2016 - Postdoctoral Fellow, Department of Mathematics, University of Manitoba, Winnipeg, Canada. (Supervisor : Prof. Stephen J. Kirkland)

March 2014 - August 2015, Postdoctoral Fellow, Department of Mathematics, Technion, Israel Institute of Technology, Haifa, Israel. (Supervisors : Prof. Abraham Berman and Prof. Naomi Shaked-Monderer)(German-Israeli Foundation for Scientific and Research development grant number: 1135-18.6/2011)

September 2013 - February 2014, Postdoctoral Fellow, Stat-Math division, Indian Statistical Institute Delhi, New Delhi. (Supervisor : Prof. Ravindra B. Bapat)

August 2013, Summer Student, Department of Mathematics, Technion, Israel Institute of Technology, Haifa, Israel.

July 2010- July 2013, Senior research fellow, Department of Mathematics, IIT Madras.

July 2008- July 2010, Junior research fellow, Department of Mathematics, IIT Madras.

ACADEMIC ACHIEVEMENTS

"Excellent Young Teacher Award - 2020", IIT Kharagpur (Rs 2,00,000 cash award).

Postdoctoral fellowship 2015, University of Manitoba, Winnipeg, Canada.

Postdoctoral fellowship under German-Israeli Foundation for Scientific and Research development 2014, The Technion Israel Institute of Technology, Haifa, Israel.

Indian Statistical Institute Visiting Scientist fellowship 2013 (Postdoctoral fellowship).

Awarded full Scholarship for attending the summer school in Nonnegative matrices and its application by The Technion, Israel Institute of Technology, August 2013.

National Board for Higher Mathematics, Post doctoral fellowship 2013.

Qualified National Board for Higher Mathematics, Scholarship for Ph.D in Mathematics- 2009.

Qualified CSIR-UGC Junior Research fellowship December 2007.

COURSES TAUGHT

At IIT Kharagpur

MA20103 - Partial differential equation (Autumn 2016, Autumn 2017, Autumn 2018)

MA10002 - Mathematics- II (Spring 2017, Spring 2018)

MA30003/MA41003 - Linear Algebra (Autumn 2017)

MA10001 - Mathematics- I (Autumn 2018, Autumn 2019)

MA60053 - Computational Linear Algebra (Spring 2019, Spring 2020)

MA20013 - Discrete Mathematics (Spring 2019, Spring 2020)

TS70007 - Advanced Mathematical Techniques (Autumn 2019, Autumn 2020)

MA11003 - Advanced Calulus (Autumn 2020)

MA11004 - Linear Algebra, Numerical and Complex Analysis (Spring 2021)

MA21201/MA31005 - Real Analysis (Autumn 2021)

MA51121/MA60041/MA61003 - Graph Theory and Algorithms (Autumn 2021)

SPONSORED PROJECTS

ISIRD project (Principal Investigator), sponsored by SRIC, IIT Kharagpur. (Rs 3,95,000)

SERB Early carrier research award (Principal Investigator) sponsored by Department of Science and Technology, India. (Rs 15,87,244)

SERB National Post doctoral fellowship (Mentor) sponsored by Department of Science and Technology, India. (Rs 19,20,000)

DST-SERB Matrics project (Mathematical Research Impact-Centric Support). (Rs 6,60,000)

SUPERVISION

Ph.d students:

1. Ms. Amrita Mondal (2016 -)(Jointly with Dr Bibhas Adhikari)
2. Mr. Aniruddha Samantha (2017-)(Submitted Thesis on 08-12-2021)
3. Mr. Mainak Basunia (2018-)
4. Mr. Iswar Mahato (2018-)

Post-doctoral fellows:

1. Dr. Ranjit Mehatari (2017 - 2018)(National Postdoctoral Fellowship(DST-SERB))

JOURNAL PUBLICATIONS

Published/Accepted

(Underlined name indicates B.Tech/M.Sc., students)

1. M. Rajesh Kannan, Shivaramakrishna Pragada and Hitesh Wankhede , *On the construction of cospectral nonisomorphic bipartite graphs*, Accepted for publication in Discrete Mathematics.
2. M. Rajesh Kannan, Navish Kumar and Shivaramakrishna Pragada, *Normalized Laplacians for Gain Graphs*, American Journal of Combinatorics, Volume 1 (2022), Pages 20-39.
3. Iswar Mahato and M. Rajesh Kannan, *Eccentricity energy change of complete multipartite graphs due to edge deletion*, Special Matrices, (10) 2022, 193-202. (Special Issue: Contemporary Spectral Graph Theory)
4. Iswar Mahato, R. Gurusamy, M. Rajesh Kannan and S. Arockiaraj, *On the spectral radius and the energy of eccentricity matrix of a graph*, Accepted for publication in Linear and Multilinear Algebra.
5. Aniruddha Samanta and M. Rajesh Kannan, *Distance matrices for complex unit gain graphs*, Discrete Mathematics, 345 (2022), no. 1, Paper No. 112634, 12pp.
6. Mainak Basunia, Iswar Mahato and M. Rajesh Kannan, *On the A_α-spectra of some join graphs*, Bulletin of the Malaysian Mathematical Sciences Society, 44 (2021), 4269–4297.
7. M. Rajesh Kannan, Navish Kumar and Shivaramakrishna Pragada, *On the extremal eigenvalues of gain Laplacian matrices*, Linear Algebra and its Applications, 625 (2021), 212-240.
8. Projesh Nath Choudhury, M. Rajesh Kannan and Apoorva Khare, *Sign non-reversal property for totally positive matrices and testing total positivity on their interval hull*, Bulletin of the London Mathematical Society, 53 (2021), no. 4, 981-990.
9. 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.
10. Aniruddha Samanta and M. Rajesh Kannan, *Bounds for the energy of a complex unit gain graph*, Linear Algebra and its Applications, 612 (2021), 1-29.
11. Himadri Lal Das and M. Rajesh Kannan, *On dense subsets of matrices with distinct eigenvalues and distinct singular values*, Electronic Journal of Linear Algebra, Vol. 36(2020), pp. 834-846.
12. M. Rajesh Kannan and Shivaramakrishna Pragada, *On the construction of cospectral graphs for the adjacency and the normalized Laplacian matrices*, Accepted for publication in Linear and Multilinear Algebra.
13. Iswar Mahato, R. Gurusamy, M. Rajesh Kannan and S. Arockiaraj, *Spectra of eccentricity matrices*, Discrete Applied Mathematics, 285 (2020), 252–260.
14. Ranjit Mehatari, M. Rajesh Kannan and Aniruddha Samanta, *On the Adjacency matrix of Complex Unit Gain Graphs*, Accepted for publication in Linear and Multilinear Algebra.
15. Ranjit Mehatari and M. Rajesh Kannan, *Eigenvalue bounds for some classes of matrices associated with graphs*, Czechoslovak Mathematical Journal, vol. 71, no. 1 (2021), pp. 231-251.
16. Fouzul Atik, M. Rajesh Kannan and R.B. Bapat, *On distance and Laplacian matrices of trees with matrix weights*, Linear and Multilinear Algebra, 69 (2021), no. 14, 2607-2619.

17. Fouzul Atik, R.B. Bapat and M. Rajesh Kannan, *Resistance matrices of graphs with matrix weights*, Linear Algebra and its applications, 571(2019), 41-57.

18. 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), pp. 687-694.

19. 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), pp. 35-53.

20. M. Rajesh Kannan, *P-proper splittings*, Aequationes Mathematicae, 91(2017), no. 4, 619-633.

21. Hongwei Jin, M. Rajesh Kannan and Minru Bai, *Lower and upper bounds for H-eigenvalues of even order real symmetric tensors*, Linear and Multilinear Algebra, **65** (2017), no. 7, 1402-1416.

22. Naomi Shaked-Monderer, Abraham Berman, Mirjam Dür, M. Rajesh Kannan, *SPN completable graphs*, Linear algebra and its applications, **498** (2016), 58-73.

23. M. Rajesh Kannan and K. C. Sivakumar, *On Certain Positivity Classes of Operators*, Numerical Functional Analysis and Optimization, **37** (2016), no. 2, 206-224.

24. M. Rajesh Kannan, Naomi Shaked-Monderer, Abraham Berman, *On weakly irreducible nonnegative tensors and interval hulls of some classes of tensors*, Linear and Multilinear Algebra, **64** (2016), no. 4, 667-679.

25. M. Rajesh Kannan, Naomi Shaked-Monderer , Abraham Berman, *Some properties of strong $\mathcal{H}$-tensors and general $\mathcal{H}$-tensors*, Linear Algebra and its Applications, **476** (2015), 42-55.

26. M. Rajesh Kannan and R. B. Bapat, *Generalized Principal Pivot transforms*, Linear Algebra and its Applications, **454** (2014), 49-56.

27. M. Rajesh Kannan and K. C. Sivakumar, *Intervals of Certain Classes of Z-matrices*, Discussiones Mathematicae - General Algebra and Applications, **34** (2014), 85-93.

28. M. Rajesh Kannan and K. C. Sivakumar, *P_+-matrices: A generalization of P-matrices*, Linear and Multilinear algebra, **62** (2014), 1-12.

29. M. Rajesh Kannan and K. C. Sivakumar, *Moore-Penrose inverse positivity of interval matrices*, Linear Algebra and its Applications, **436** (2012), 571-578.

Preprints/Submitted

(Underlined name indicates B.Tech/M.Sc., students)

1. Iswar Mahato and M. Rajesh Kannan, *On the eccentricity matrices of trees: Inertia and spectral symmetry*, preprint, submitted.

2. Aniruddha Samanta and M. Rajesh Kannan, *On the multiplicity of A_α-eigenvalues and the rank of complex unit gain graphs*, preprint, submitted.

3. Amrita Mandal, Bibhas Adhikari and M. Rajesh Kannan, *On the eigenvalue region of permutative doubly stochastic matrices of order up to 4*, preprint, submitted.

4. Aniruddha Samanta and M. Rajesh Kannan, *On the spectrum of complex unit gain graph*, preprint, submitted.

5. Projesh Nath Choudhury, M. Rajesh Kannan and K.C. Sivakumar, *Bounds for a solution set of linear complementarity problems over Hilbert spaces*, preprint.

6. Projesh Nath Choudhury, M. Rajesh Kannan and K.C. Sivakumar, *P-operators over ordered Banach spaces*, preprint.
7. M. Rajesh Kannan and Stephen Kirkland, *Minimizing the Kemeny constant of trees with the given degree sequence*, preprint.

REFEREE/ REVIEWER/ EXPERT OPINION

1. Linear Algebra and its Applications
2. Linear and Multilinear Algebra
3. Electronic Journal of Linear Algebra
4. Journal of Combinatorial Theory, Series B
5. Discrete Mathematics
6. Discrete Applied Mathematics
7. Special matrices
8. Open Mathematics (formerly, Central European Journal of Mathematics)
9. Frontiers of Mathematics in China
10. Advances in Operator Theory
11. Applied Mathematics and Computation
12. Khayyam Journal of Mathematics
13. Discrete Mathematics, Algorithms and Applications
14. Filomat
15. Bulletin of the Iranian Mathematical Society
16. American Mathematical Society(AMS) Mathematical Reviews

CONFERENCES, WORKSHOPS ORGANIZING/ORGANIZED

1. Weekly e-seminar on "Graphs, matrices and applications", from 24 July 2020.
2. Weekly seminar on "Graphs, matrices and applications", in the Department of Mathematics, IIT Kharagpur, from January 2018 - March 2020.
3. AICTE QIP short term course on "Advanced Matrix Algebra and Applications" 18 - 22 Sepetember 2019 in the Department of Mathematics, IIT Kharagpur.
4. AICTE QIP short term course on "Linear Algebra and Differential Equations" 24 - 28 August 2018 in the Department of Mathematics, IIT Kharagpur.
5. Lecture series "Combinatorics commutative algebra: Introduction to edge ideals", from 02 - 06 July 2018 in the Department of Mathematics and Center for Theoretical Studies, IIT Kharagpur.

INVITED TALKS IN CONFERENCES/WORKSHOPS

1. Mini workshop on "Linear complementarily problems and generalizations" September 24- 25, 2016, Indian Statistical Institute Chennai Center, Chennai, Tamil Nadu.
2. NBHM sponsored two days "National seminar on some recent research directions in graph theory" March 9 -10, 2017, The centre for Graph Theory, Ayya Nadar Janaki Ammal College, Sivakasi, Tamil Nadu.
3. National Conference on "Some Contemporary Research Direction in Discrete Mathematics" May 30, 2017, organized by Department of Mathematics, Mepco Schlenk engineering college, Sivakasi, Tamil Nadu.
4. Workshop on "Nonnegative matrices and applications" December16, 2017, Department of Mathematics, NITK Surathkal, Karnataka.
5. Conference on "Applications of Mathematics and science in engineering" January 21, 2018,Department of Mathematics, NIT Raipur, Chhattisgarh .
6. A six day workshop on "Algebraic Graph Theory" January 25 - 30, 2018, Department of Mathematics, NITK Surathkal, Karnataka.
7. A two days symposium on "Nonlinear analysis and Fluid dynamics", March 30-31, 2018, Department of Mathematics, IIT Madras, Chennai, Tamil Nadu.
8. One week workshop on "Analysis, Algebra and descriptive statistics" June 4 -9, 2018, Department of Mathematics, Mepco Schlenk engineering college, Sivakasi, Tamil Nadu.
9. Conference on "Analysis and applications", June 18-22, 2018, Department of Mathematics. IIT Madras, Chennai, Tamil Nadu.
10. "CALDAM 2019" 5th Annual International Conference on Algorithms and Discrete Applied Mathematics IIT Kharagpur. February 14-16, 2019
11. "Two-day National seminar on emerging trends in Topology and Geometry", February 15-16, 2019, organized by ANJA College, Sivakasi, Tamil Nadu.
12. International conference on "Emerging area of Mathematics for science and technology", 19 February 2019, organized by Rathinam College of Arts and Science, Coimbatore, Tamil Nadu.
13. "International Conference on Number Theory and Graph Theory", June 27-29, 2019, Department of Studies in Mathematics, University of Mysore, Mysuru, Karnataka.
14. "Workshop on Spectral Graph Theory", November 16-20, 2019, Indian Institute of Technology Ropar, Punjab.
15. "Conference on Linear Algebra and its Applications" in honour of Prof Ravindra B Bapat, December 26-27, 2019, Indian Statistical Institute, Delhi Centre, New Delhi.
16. Two days Online Faculty Development Programme on “Algebra and Number Theory”, 25-26 May, 2020, Department of Mathematics, Ramco Institute of Technology, Rajapalayam, Tamil Nadu. (Webinar)
17. International Faculty Development Programme on “Avant-garde trends in Mathematics,” 17-23 June, 2020, Bannari Amman Institute of Technology, Sathyamangalam, Tamil Nadu. (Webinar)
18. ”Online workshop on Numerical Linear Algebra”, 19-25 Sepetember 2020, Department of Mathematics, Assam University, Silchar, Assam. (Webinar)

19. Faculty Development Training Programme on Discrete Mathematics, 28 June - 03 July 2021, Department of Mathematics, Ramco Institute of Technology, Rajapalayam, Tamil Nadu. (Webinar)
20. "Online - Six-Day FDTP on Algebra and Number Theory", 24-05-2021 to 29-05-2021, Department of Mathematics, KGiSL Institute of Technology, Coimbatore, Tamil Nadu. (Webinar)
21. "VYKHARI - International Lecture Series", 15-09-2021 to 1-10-2021, BCM College, Kottayam, Kerala. (Webinar)
22. Pre-workshop for "International Conference on Discrete Mathematics", October 8-10, 2021, Department of Mathematics, Manonmaniam Sundranar University, Tirunelveli, Tamil Nadu. (Webinar)
23. "Online Refresher Course in Mathematics (Algebraic Graph Theory)", October 16-29, UGC-Human Resource Development Centre, Savitribai Phule Pune University, Pune, Maharashtra. (Webinar)
24. "GANITHA GARIMA", A workshop on core areas of Mathematics (Algebraic Graph Theory), 29-11-2021 to 03-12- 2021, Department of Mathematics, University of Kerala, Thiruvananthapuram, Kerala. (Webinar)

CONTRIBUTED TALKS

1. January, 2012 : International Conference on Game Theory, Operations Research and their Applications (GTORA 2012), Indian Statistical Institute, Chennai center, India. (Title: P_+-matrices: A generalization of P-matrices.)
2. August, 2013 : Summer school in Nonnegative matrices: Theory and Applications, The Technion, Israel Institute of Technology, Haifa, Israel. (Title: P_+-matrices: A generalization of P-matrices.)
3. August, 2014 : Summer school in Nonnegative matrices: Theory and Applications, The Technion, Israel Institute of Technology, Haifa, Israel. (Title: Spectral theory of nonnegative tensors)
4. October, 2014: Department of Mathematics, Indian Institute of Technology Hyderabad, Hyderabad, India. (Title: Spectral theory of nonnegative tensors)
5. October, 2014: Department of Mathematics, Indian Institute of Technology Madras, Chennai, India. (Title: Spectral theory of nonnegative tensors)
6. October, 2014: Indian Statistical Institute, Chennai center, India. (Title: Spectral theory of nonnegative tensors)
7. May, 2016: Western Canadian Linear Algebra Meeting, University of Manitoba, Winnipeg, Canada. (Title: Some properties of semipositive matrices)
8. December, 2017: ICLAA 2017 : International Conference on Linear Algebra and its Applications, Manipal University, Manipal, Karnataka, India.

DECLARATION

I confirm that all the above stated particulars in this CV are true to the best of my knowledge and that I can provide documentary evidence to verify all the given information.

M. Rajesh Kannan