

Dr. R. S. RAJA DURAI

Office Address:

Department of Mathematics,
Jaypee University of Information
Waknaghat, *Technology*
District Solan - 173 234,
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Residential Address:

43/16, Balaraman Street,
Ganapathy puram,
East Tambaram,
Chennai - 600 059,
INDIA.
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CAREER OBJECTIVE: *Strong desire in teaching profession in the areas of applied mathematics and also prefer to pursue research in the fields of Algebraic coding theory, Sequence design for mobile communications and Distributed video coding, in tandem.*

Personal Details:

DATE OF BIRTH : 14th May 1975
PLACE OF BIRTH : **Tamil Nadu, India**
SEX : **Male**
LANGUAGES : **Tamil, English, Japanese, French**
NATIONALITY : **Indian**

Academic Qualifications:

Ph. D. Algebraic Coding Theory	July 2004	Indian Institute of Technology Madras Chennai - 600 036, INDIA Specialization:– Algebraic Coding Theory Thesis Title :– On Linear Codes with Rank Metric: Constructions, Properties and Appli- cations
M. Sc. Mathematics	May 1999	Indian Institute of Technology Madras Chennai - 600 036, INDIA
B. Sc. Mathematics	June 1997	Loyola College Chennai - 600 034, INDIA
H. S. C.	May 1994	Corley H.S.S., Chennai - 600 059, INDIA
S. S. L. C.	June 1992	Corley H.S.S., Chennai - 600 059, INDIA

Present Employment:

Associate Professor

Department of Mathematics,

Jaypee University of Information Technology (Jaypee University),

Waknaghat, District Solan - 173 234,

Himachal Pradesh, INDIA.

E-mail: *rsraja.durai@juit.ac.in* | *rs_raja_durai@yahoo.co.in*

Web : *http://www.juit.ac.in/department/maths/maths.php*

Areas of Research Interest:

My long term areas of research interests include are Algebraic coding theory, Sequence design for spread spectrum communications, Distributed video coding, image and video processing, and also prefer to pursue research in a mathematical research area which is applied in nature. I am also interested in the implementation of error-control codes and spread-sequences to real channels; explicating various problems in these areas possibly with programming aid from computer language(s).

Research Experience

06/1999 - 03/2000	<i>Project Associate</i> ISRO Project Entitled: A New ARQ Protocol Using Concatenated RD Codes	Indian Institute of Technology Madras Chennai - 600 036, INDIA
07/2000 - 06/2002	<i>Junior Research Fellow</i> Department of Mathematics	Indian Institute of Technology Madras Chennai - 600 036, INDIA
07/2002 - 06/2004	<i>Senior Research Fellow</i> Department of Mathematics	Indian Institute of Technology Madras Chennai - 600 036, INDIA
07/2004 - 03/2005	<i>Post-doctoral Research Fellow</i> Prof. Suehiro's Lab	University of Tsukuba Tsukuba - 305 0006, JAPAN
05/2005 - 04/2006	<i>Post-doctoral Research Fellow</i> TEMICS Research Team	IRISA/INRIA 35042 - Rennes, FRANCE

Areas of Teaching Interest:

Applied Linear Algebra, Applied Calculus, (symmetric) Group theory and its application to robotics studies, Graph Theory, Discrete Mathematics, Data structures and scientific computing, Probability theory and random processes, Numerical Methods, Operation Research, Real Analysis, Complex Variables, Functional Analysis, Partial Differential Equations, and Algebraic Coding Theory.

Teaching Experience:

07/2000 - 06/2002	<i>Teaching Assistant</i> Handled tutorials for B.Tech., M.Tech. and M.Sc. (Maths)	Indian Institute of Technology Madras Chennai - 600 036, INDIA
06/2006 - 06/2008	<i>Lecturer</i> Taken classes for B.Tech, MS, BCA, B.Sc.(CS) <i>Assistant Professor</i> Taken classes for B.Tech, MCA	VIT University, Vellore - 632 014, INDIA Dr. MGR University, Chennai - 600 095, INDIA
07/2008 - 07/2013	<i>Assistant Professor</i> Handling classes for UG with Ph.D guidance	Jaypee University, Solan - 173 234, INDIA
08/2013 - todate	<i>Associate Professor</i> Handling classes for UG with Ph.D guidance	Jaypee University, Solan - 173 234, INDIA

Research Guidance:

S. No.	Name	Thesis Title	Remark
1.	Meenakshi Devi	On the class of T-Direct codes: Constructions, Properties and Applications	Completed
2.	Ashwini Kumar	On the class of MRD-LCD codes	On-going

Member - Professional Activities:

- Member - IEEE
- Member - Institute of Electronics, Information and Communication Engineers
- Member of the organizing committee of the **Interdisciplinary Mathematical and Statistical Techniques** (IMST 2009 - FIM XVIII) held at Jaypee University of Information Technology, Wanknaghat, India, during 2-4 August, 2009.

Additional Skills & Knowledge:

Operating Systems	-	Windows, Unix, Linux
Software Packages	-	MATLAB, L ^A T _E X
Programming Languages	-	FORTRAN, Pascal, C, C++, Java, EJB, ASP, Visual Basic, and Oracle 8i
Information Technologies	-	Website design and development with HTML, XML, XSL, and DOM. Server-side/client-side scripting with JavaScript, Java applet/servlet, ASP, JSP. Database programming with ODBC/JDBC.

PROFESSIONAL COURSES & WORKSHOPS ATTENDED

- (a) Attended an IUCEE Workshop on “**Image Processing and Digital Communications**” by Prof. Gaurav Sharma (University of Rochester) held at *Jaypee University of Engineering & Technology*, Guna, Madhya Pradesh, India during June 6 - 10, 2011.
- (b) Attended an IUCEE Workshop on “**Effective Teaching**” by Prof. Veena Kumar (Rutgers University) held at *Jaypee University of Information Technology*, Waknaghat, Himachal Pradesh, India during June 1 - 6, 2012.
- (c) Attended the “**FDP on Excellence in Teaching, Research & Education - by Design**” held at Jaypee University of Information Technology during July 14 - 19, 2014.
- (d) Attended the “**Workshop on Statistical Techniques in Biological and Medical Sciences**” (STBMS-16) held at Jaypee University of Information Technology during June 13 - 18, 2016.
- (e) Attended the QIP on “**Stochastic Modeling and Optimal Control of Engineering Systems**” held at QIP Centre, IIT Roorkee during May 22 - 26, 2017.
- (f) Attended the “**Workshop on Statistical Techniques in Biological and Medical Sciences**” (STBMS-18) held at Jaypee University of Information Technology during June 04 - 09, 2018.
- (g) Attended the seven-day international online FDP on “**Research Methods and Analytical Techniques**” jointly organized by M.B.Harris College of Arts, A.E.Kalsekar College of Commerce and Parul University during June 17 - 23, 2020. (Zoom)
- (h) Attended the six-day national webinar series on “**Application of Mathematics**” organized by the Department of Mathematics, KPR Institute of Engineering and Technology, Coimbatore, Tamil Nadu during 06 - 11, July 2020. (Google meet youtube)
- (i) Attended a five-day International virtual conference on “**E-Learning Blackboard to Broadband - B2B**” organized by School of Science, Rathinam College of Arts & Science, Coimbatore, Tamil Nadu during 13 - 17, July 2020. (Zoom)
- (j) Attended a one-day national webinar on “**Artificial Intelligence with Learning Concept**” jointly organized by M.B.Harris College of Arts, A.E.Kalsekar College of Commerce and Management, Nalasopara West, Mumbai on 15 July 2020. (Google meet)
- (k) Attended the six-day FDP on “**Applications of Mathematics in Engineering**” organized by Department of Mathematics, KPR Institute of Engineering and Technology during July 20 - 25, 2020. (youtube)
- (l) Attended a five-day FDP on “**Innovative Teaching Learning Practices: A Way to Transform Teachers**” organized by Institute of Information Technology and Management (IITM) during 27 - 31 July, 2020. (Go-to-Meeting).

- (m) Attended the 10-day online FDP on “**Data Science and its applications with Python**” organized by Electronics and ICT Academy, NIT Warangal during 10 - 19, May 2021. (Cisco WebEX)
- (n) Attended the 5-day online STC on “**Computational software (MATLAB & MATHEMATICA)**” organized by Sardar Vallabhai NIT Surat during 17 - 21, May 2021. (Google Meet)
- (m) Attended the 1-week online FDP on “**Advance Excel with Data Visualization**” organized by Electronics and ICT Academy, IIT Kanpur during 31st May - 05 June 2021. (WebEX)

Conferences/Workshops/Symposia/Seminars Attended/Presented:

- (1) A paper entitled **“Some Results on T -Direct Codes”** was presented at the *3rd Asia-Europe Workshop on Information Theory*, Kamogawa, Chiba, Japan, June 25-28, 2003.
- (2) A paper entitled **“ T -Direct Cyclic Codes: A Necessary and Sufficient Condition”** was presented at *the National Seminar on Discrete Mathematics and Annual Conference of Kerala Mathematical Association*, Kozhencherry, Kerala, India, January 9-11, 2003.
- (3) A paper entitled **“ T -Direct Codes: An Application to T -user BAC”** was presented at the *2002 IEEE Information Theory Workshop*, Bangalore, India, October 20-25, 2002.
- (4) A paper entitled **“Maximum Rank Distance Codes with Complementary Duals”** was presented at *the Joint 9th National Conference of The Vijnana Parishad of India on Applied and Industrial Mathematics And 5th Annual Conference of Indian Society of Information Theory and Applications* held at the Nethaji Subhas Institute of Technology, New Delhi, India, February 22-24, 2002.
- (5) A paper entitled **“An Error-Erasure Decoding Algorithm to the $\mu - [n^{\times \Delta}, k]$ Tensor Codes for the Rank Metric”** was presented at *the National Conference on Challenges of the 21st Century in Mathematics and its allied topics*, University of Mysore, India, February 3-4, 2001.
- (6) A paper entitled **“An Error-Erasure Technique for the Class of MRD Codes”** was presented at *the 15th Annual Conference of the Ramanujam Mathematical Society*, Chennai, India, June 5-7, 2000.
- (7) A paper entitled **“A Note on T -Direct Codes and its Applications”** was presented at the *NSMMA*, IIT Madras, Chennai, India, December 22, 2003.
- (8) Attended the *National Symposium on the role of Mobile Communications in the developing countries* held at CMCDC, Allahabad University, India during February 23-24, 2004.
- (9) A paper entitled **“Multiple-rate Maximum Rank Distance Codes”** presented at the *14th International Symposium on Information Theory and Its Applications (ISITA)*, Monterey, California, USA, 30th October - 2nd November 2016.
- (10) Attended the 2020 IEEE International Conference on Communications (ICC) on virtual mode from Ireland during June 7-11, 2020.

Place : Waknaghat, Solan, HP (INDIA)

(Dr. R. S. RAJA DURAI)

List Of Publications (Journals/Conferences/Workshops/Symposia):**(A) Post-Graduate project**

- [1] R. S. Raja Durai and W. B. Vasantha, “**Hyperloops and Hypergroupoids,**” *International Journal of Physical Sciences*, vol. 12, no. 3, pp. 237–247, September 2000.

(B) Doctoral Research [INDIA]Specialization : *Algebraic Coding Theory*

- [2] W. B. Vasantha and R. S. Raja Durai, “**Some Results on T -Direct Codes,**” in *Proceedings of the 3rd Asia-Europe Workshop on Information Theory*, pp. 43–44, Kamogawa, Chiba, Japan, June 25-28, 2003.
- [3] W. B. Vasantha and R. S. Raja Durai, “ **T -Direct codes: An Application to T -user BAC,**” in *Proceedings of the 2002 IEEE Information Theory Workshop*, p. 214, Bangalore, India, October 20-25, 2002.
- [4] W. B. Vasantha and R. S. Raja Durai, “**Maximum Rank Distance Codes with Complementary Duals,**” *Mathematics and Information Theory: Recent Topics and Applications*, V. K. Kapoor, Editor. New Delhi: Anamaya Publishers, pp. 86–90, February 2002.
- [5] W. B. Vasantha and R. S. Raja Durai, “**An Error-Erasure Decoding Algorithm to the μ - $[n^{\times\Delta}, k]$ Tensor Codes for the Rank Metric,**” in *Proceedings of the Challenges of the 21st Century in Mathematics and its Allied Topics*, pp. 219–223, University of Mysore, India, February 24-26, 2001.
- [6] W. B. Vasantha and R. S. Raja Durai, “ **T -Direct Cyclic Codes: A Necessary and Sufficient Condition,**” in *Proceedings of the National Seminar on Discrete Mathematics and Annual Conference of Kerala Mathematical Association*, Kozhencherry, Kerala, India, January 9-11, 2003.

(C) Post-Doctoral Research [JAPAN]Specialization : *Sequence Design*

- [7] R. S. Raja Durai and Naoki Suehiro, “**A New Class of 2^N -ary Sequences: Construction and Properties**” in *proceedings of the Joint IST Workshop on Mobile Future and Symposium on Trends in Communications (SympoTIC'04)*, pp. 70-73, October 24-26, 2004, Bratislava, Slovakia.
- [8] R. S. Raja Durai, Naoki Suehiro, and Han Chenggao, “**Complete-Complementary Sequences of Different Lengths,**” in *proceedings of the International Workshop on Sequence Design and its Applications in communications (IWSDA'05)*, pp. 48-50, October 10-14, 2005, Shimonoseki, Yamaguchi, Japan.

(D) Post-Doctoral Research/Implementation [FRANCE]

Specialization :
Distributed Video Coding

(a) Research work

[9] R. S. Raja Durai, “**Distributed Source Coding Using T -Direct Codes**”, in *the proceedings of SympoTIC’06*, pp. 24-27, June 2006, Bratislava, Slovakia.

(b) Major Implementation Works (using C/C++)

- (i) Generation of side-information (Y) by frame-interpolation (at the decoder)
- (ii) *Chrominance* (U, V) components coding: without motion estimation
- (iii) Correlation estimation between *Wyner-Ziv* frame X and Y (at the encoder)
- (iv) *Laplacian* param online computation from *MC* key-frames (at the decoder)
- (v) *Laplacian* param online computation from previous decoded frames
- (vi) Rate control strategy (*Distributed Video Coding*)

(E) Lecturer (Mathematics) [VIT University, INDIA]

[10] R. S. Raja Durai, Naoki Suehiro, and Han Chenggao “**Higher Dimensional Complete-Complementary Sequences: A Generalized Approach**”, in proceedings of *ISITA 2006*, pp. 928-933, 29th October - 1st November 2006, COEX, Seoul, Korea.

[11] R. S. Raja Durai, Naoki Suehiro, and Han Chenggao, “**Complete-Complementary Sequences of Different Length**”, *IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences*, vol. E90-A, no. 7, pp. 1428-1431, July 2007.

(F) Assistant/Associate Professor (Mathematics) [Jaypee University, INDIA]

[12] R. S. Raja Durai, “**A Class of Optimal Complete-Complementary Codes of Different Length**,” in proceedings of 5th *International Workshop on Signal Design and its Applications in Communications (IWSDA’11)*, pp. 92-95, October 10-14, 2011, Guilin, China.

[13] R. S. Raja Durai and Meenakshi Devi, “**Construction of $(\mathcal{N} + \mathcal{M})$ -Direct codes in $GF(2^{\mathcal{N}})$** ,” in proceedings of *World Congress on Information and Communication Technologies (WICT’11)*, pp. 766-771, December 11-14, 2011, Mumbai, India.

[14] R. S. Raja Durai and Meenakshi Devi, “**Coding and Capacity Calculation for the \mathcal{T} -user F-Adder Channel**,” *Communications in Computer and Information Science* (Springer), vol. 283, pp. 542-551, 2012.

[15] R. S. Raja Durai and Meenakshi Devi, “**Concatenated Codes with Complementary Duals**,” *GAMS Journal of Mathematics and Mathematical Biosciences* (GAMS-JMMB), vol. 3, pp. 1-10, 2012.

[16] R. S. Raja Durai and Meenakshi Devi, “**On the Class of \mathcal{T} -Direct Codes Over $GF(2^{\mathcal{N}})$** ,” *International Journal of Computer Information Systems and Industrial Management (IJCISIM)*, vol. 5, pp. 589-596, 2013.

- [17] R. S. Raja Durai and Meenakshi Devi, “**Some constructions of \mathcal{T} -Direct codes over $\text{GF}(2^N)$,**” *Advances in Intelligent Systems and Computing*, vol. 235, pp. 123-129, 2014.
- [18] R. S. Raja Durai and Meenakshi Devi, “**A Coding Scheme that Increases the Code Rate,**” *Journal of Computational and Applied Mathematics (Springer)*, vol. 33(3), pp. 575-589, October 2014.
- [19] R. S. Raja Durai, “**Multiple-rate maximum rank distance codes**”, in proceedings of the 14th *International Symposium on Information Theory and Its Applications (ISITA)*, Monterey, California, USA, 30th October - 2nd November 2016, pp. 696-699.
- [20] Meenakshi Devi, R. S. Raja Durai, and Hongjun Xu, “**Construction of high rate \mathcal{T} -Direct codes,**” *Journal of Computational and Applied Mathematics (Springer)*, vol. 37(5), pp. 5844-5856, November 2018.
- [21] Meenakshi Devi, R. S. Raja Durai and Hongjun Xu, “**Design of \mathcal{T} -Direct codes over $\text{GF}(2^N)$ with increased users**”, *Finite Fields and Their Applications*, vol. 55, pp. 202-215, 2019.
- [22] R. S. Raja Durai, Meenakshi Devi and Ashwini Kumar, “**Multiple-rate error-correcting coding scheme**”, *Applicable Algebra in Engineering, Communication and Computing (AAECC)*, June 2020. DOI: doi.org/10.1007/s00200-020-00435-x
- [23] Meenakshi Devi, R. S. Raja Durai, Hongjun Xu, and Ashwini Kumar “**Some Important Results on \mathcal{T} -Direct Codes**”, *Discrete Mathematics, Algorithms and Applications (DMAA)*, vol. 13, no. 3, 2150067 (12 pages), January 2021. DOI: doi.org/10.1142/S1793830921501172
- [24] Ashwini Kumar and R. S. Raja Durai, “**Construction of LCD MRD Codes of Length $n > N$** ”, *Discrete Mathematics, Algorithms and Applications*, 2150117, April 2021. DOI: doi.org/10.1142/S1793830921501172

BOOKS PUBLICATIONS

- [1] W. B. Vasantha Kandasamy, Florentin Smarandache, R. Sujatha, and **R. S. Raja Durai**, “**Erasure Techniques in MRD Codes,**” Columbus, OH: ZIP publishing, 2012. [ISBN: 978-1-59973-177-3]

Place : Wagnaghat, Solan, HP (INDIA)

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Important Publications

- [11] R. S. Raja Durai, Naoki Suehiro, and Han Chenggao, “**Complete-Complementary Sequences of Length**”, *IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences*, Vol.E90-A, No. 7, pp.1428-1431, July 2007.
- [13] R. S. Raja Durai and Meenakshi Devi, “**Construction of $(\mathcal{N} + \mathcal{M})$ -Direct codes in $GF(2^N)$** ,” in proceedings of *World Congress on Information and Communication Technologies (WICT'11)*, pp. 770-775, December 11-14, 2011, Mumbai, India.
- [17] R. S. Raja Durai and Meenakshi Devi, “**Some constructions of \mathcal{T} -Direct codes over $GF(2^N)$** ,” *Advances in Intelligent Systems and Computing*, vol. 235, pp. 123-129, 2014.
- [18] R. S. Raja Durai and Meenakshi Devi, “**A Coding Scheme that Increases the Code Rate**,” *Journal of Computational and Applied Mathematics (Springer)*, vol. 33(3), pp. 575-589, October 2014.
- [19] R. S. Raja Durai, “**Multiple-rate maximum rank distance codes**”, in proceedings of the *14th International Symposium on Information Theory and Its Applications (ISITA)*, Monterey, California, USA, 30th October - 2nd November 2016, pp. 696-699.
- [20] Meenakshi Devi, R. S. Raja Durai, and Hongjun Xu, “**Construction of high rate \mathcal{T} -Direct codes**,” *Journal of Computational and Applied Mathematics (Springer)*, vol. 37(5), pp. 5844-5856, November 2018.
- [21] Meenakshi Devi, R. S. Raja Durai and Hongjun Xu, “**Design of \mathcal{T} -Direct codes over $GF(2^N)$ with increased users**”, *Finite Fields and Their Applications*, vol. 55, pp. 202-215, 2019.
- [22] R. S. Raja Durai, Meenakshi Devi and Ashwini Kumar, “**Multiple-rate error-correcting coding scheme**”, *Applicable Algebra in Engineering, Communication and Computing (AAECC)*, June 2020. DOI: doi.org/10.1007/s00200-020-00435-x

INVITED SEMINAR TALKS

Invited Seminar Talks/Lectures

- (i) Delivered an invited talk on “**Probability: The Measure of Uncertainty**” at the Department of Mathematics, *St. Thomas College of Arts and Science, Koyambedu, Chennai - 600 028* on 9th February 2007.
- (ii) Delivered an invited talk on “**Statistical data analysis using SPSS**” in the workshop of the Statistical Techniques in Biological and Medical Sciences (STBMS) held at Jaypee University of Information Technology, Solan - 173234, Himachal Pradesh during 4-9 June, 2018.
- (iii) Delivered an invited talk on “**Probability Models**” at the one-day national level webinar programme on “**New Directions in Pure & Applied Mathematics**” hosted by Govt. Ats College, Kumbakonam, Tamil Nadu (India) on 29th June 2020.