



Ruchi Das

*Professor and Head, Department of Mathematics
Ex-Dean, Faculty of Mathematical Sciences, University of Delhi*

Current Assignments

- ☆ Head, Department of Mathematics, **University of Delhi**.

Education

- 1996 **Ph.D. Mathematics**, *The MS University of Baroda, Vadodara*, with the thesis entitled "*Expansive homeomorphisms on topological spaces and G -spaces*".
- 1988 **M.Sc. Mathematics**, *University of Allahabad, Allahabad*.

Research Experience

Areas of Specialization

Dynamical Systems, Topology, Analysis.

Post Doctoral Fellow (2000-2001)

Greek Govt. Scholarship at Department of Mathematics, University of Athens, Greece.

Membership of Professional Bodies

- ☆ Life member of **Ramanujan Mathematical Society**.
- ☆ Life member of **Indian Mathematical Society**.
- ☆ Life member of **Indian Science Congress Association**.
- ☆ Life member of **Gujarat Ganit Mandal**.
- ☆ Life member of **Bombay Mathematical Society**.
- ☆ Life member of **Himachal Ganit Parishad**.

Publications

Following are recent ones...

- ☆ **Topological equicontinuity and topological uniform rigidity for dynamical system**, *Filomat*, 2023, Vol. 37, No. 20, 6813-6822, (with Devender Kumar).
- ☆ **Multi-sensitivity with respect to a vector for semiflows defined on Hausdorff uniform spaces**, *Semigroup Forum*, 2023, Vol. 106, No. 2, 444-459, (with Arpit Mahajan and Rahul Thakur).

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- ☆ **Topological sensitivity on Hyperpaces**, *To appear in Bulletin of the Belgian Math. Society- Simon Stevin*, 2022, Vol. 29, No. 1, 19-36, (with Devender Kumar and Mohammad Salman).
- ☆ **On variants of n-sensitivity in semiflows**, *Journal Difference Equations and Applications*, 2022, Vol 28; No. 8, 1039-1053, 2022, Vol 28, No. 8 , 1039-1053. (with Rahul Thakur)
- ☆ **Remarks on sensitivity and chaos in non autonomous dynamical systems**, *Journal Difference Equations and Applications*, 2022, Vol 28; No. 2, 289-294, (with Mohammad Salman).
- ☆ **Specification and shadowing properties for non-autonomous systems**, *Journal of Dynamical and Control Systems*, 2022, Vol 28, No. 3, 481-492, (with Radhika Vasisht).
- ☆ **Chaotic behaviour of maps possessing the almost average shadowing property**, *Haceteppe Journal of Mathematics and Statistics*, 2021, Vol. 50; No. 5; 1371-1383, (with Mukta Garg).
- ☆ **Generalizations of expansiveness in non-autonomous discrete system**, *Bulletin of the Iranian Mathematical Society*, 2022, Vol 48; No. 2, 417-433, (with Radhika Vasisht).
- ☆ **Variants of shadowing properties for iterated function systems on uniform spaces**, *Filomat*, 2021, Vol. 35; No. 8; 2565-2572, (with Radhika Vasisht and Mohammad Salman).
- ☆ **Sensitivity for non-autonomous dynamical systems on uniform spaces**, *International Journal of Bifurcation and Chaos*, 2021, Vol. 31, No. 1, 2150017 (12 pages), (with Mohammad Salman and Xinxing Wu).
- ☆ **Hypercyclic operators for iterated function systems**, *Haceteppe Journal of Mathematics and Statistics*, 2021, Vol. 50; No. 2; 483-491, (with Mohammad Salman).
- ☆ **Sensitivity and chaos on product and on hyperspatial semiflows**, *Journal of Difference Equations and Applications*, 2021, Vol 27; No. 1; 1-15 , (with Rahul Thakur).
- ☆ **Transitivity and sensitivity of iterated function systems via Furstenberg families**, *Aequationes Mathematicae*, 2020, Vol. 94, No. 6, 1123-1140, (with Rahul Thakur).
- ☆ **Multi-sensitivity with respect to a vector for semiflows**, *Semigroup Forum*, 2020, Vol. 101, No. 2, 452-464, (with Rahul Thakur).
- ☆ **Sensitivity and Property P in Non-Autonomous Systems**, *Mediterranean Journal of Mathematics*, 2020, Vol. 17, No. 4, 128, (with Mohammad Salman).
- ☆ **Specification properties for non-autonomous discrete systems**, *Topological Methods in Nonlinear Analysis*, 2020, Vol. 55, No. 2, pp. 475-491, (with Mohammad Salman).
- ☆ **Multi-transitivity in non-autonomous discrete systems**, *Topology and its Applications*, 2020, Vol. 278, 107237, (with Mohammad Salman).

- ☆ **Strongly Ruelle-Takens, strongly Auslander-Yorke and Poicaré chaos on semi-flows**, *Communications in Nonlinear Science and Numerical Simulation*, 2020, Vol. 81, 105018, (with Rahul Thakur).
- ☆ **Distributional chaos on uniform spaces**, *Qualitative Theory of Dynamical Systems*, 2020, Vol. 19, No. 4, pp. 1-13, (with Sejal Shah and Tarun Das).
- ☆ **Furstenberg families and transitivity in non-autonomous systems**, *Asian-European Journal of Mathematics*, 2020, Vol. 13, No. 1, 2050029, (with Radhika Vasisht).
- ☆ **Stronger forms of sensitivity on product dynamical system via Furstenberg families**, *Studia Scientiarum Mathematicarum Hungarica*, 2019, Vol. 56, No. 4, pp. 440-453, (with Rahul Thakur).
- ☆ **Furstenberg family and multi-sensitivity in non-autonomous systems**, *Journal of Difference Equations and Applications*, 2019, Vol. 25, No. 12, pp. 1755-1767, (with Mohammad Salman).
- ☆ **A note on F -sensitivity for non-autonomous systems**, *Journal of Difference Equations and Applications*, 2019, Vol. 25, No. 4, pp. 548-559, (with Radhika Vasisht).
- ☆ **Dynamics of weakly mixing non-autonomous systems**, *International Journal of Bifurcation and Chaos*, 2019, Vol. 29, No. 9, 1950123 (11 pages), (with Mohammad Salman).
- ☆ **Devaney chaos and stronger forms of sensitivity on the product of semiflows**, *Semigroup Forum*, 2019, Vol. 98, No. 3, pp. 631-644, (with Rahul Thakur).
- ☆ **Induced dynamics in hyperspaces of non-autonomous discrete systems**, *Filomat*, 2019, Vol. 33, no. 7, pp. 1911-1920, (with Radhika Vasisht).
- ☆ **Sensitivity, Property P and Uniform Entropy**, *Asian-European Journal of Mathematics*, 2019, Vol. 12, No. 1, 1950002 (8 pages), (with Sejal Shah and Tarun Das).
- ☆ **Multi-sensitivity and other stronger forms of sensitivity in non-autonomous discrete systems**, *Chaos Solitons & Fractals*, 2018, Vol. 115, pp. 341–348, (with Mohammad Salman).
- ☆ **On stronger forms of sensitivity in non-autonomous systems**, *Taiwanese Journal of Mathematics*, 2018, Vol. 22, No. 5, pp. 1139–1159, (with Radhika Vasisht).
- ☆ **Transitivities of maps on G -spaces**, *Advances in Pure & Applied Mathematics*, 2018, Vol. 9, No. 2, pp. 75–83, (with Mukta Garg).
- ☆ **Bowen's decomposition theorem for topologically Anosov homeomorphisms on non-compact and non-metrizable spaces**, *Communications of the Korean Mathematical Society*, 2018, Vol. 33, No. 1, pp. 337-344, (with Sejal Shah and Tarun Das).
- ☆ **Continuous semi-flows with the almost average shadowing property**, *Chaos Solitons & Fractals*, 2017, Vol. 105, pp. 1-7, (with Mukta Garg).
- ☆ **When a minimal map is totally transitive on a G -Space**, *Journal of Dynamical and Control Systems*, 2017, Vol. 23, No. 3, pp. 499-508, (with Mukta Garg).

- ☆ **Exploring stronger forms of transitivity on G -Spaces**, *Matematicki Vesnik*, 2017, Vol. 69, No. 3, pp. 164–175, (with Mukta Garg).
- ☆ **Average chain transitivity and the almost average shadowing property**, *Communications of the Korean Mathematical Society*, 2017, Vol. 32, No. 1, pp. 201-214, (with Mukta Garg).
- ☆ **Relations of the almost average shadowing property with ergodicity and proximality**, *Chaos Solitons & Fractals*, 2016, Vol. 91, pp. 430-433, (with Mukta Garg).
- ☆ **Specification property for topological spaces**, *Journal of Dynamical and Control Systems*, 2016, Vol. 22, No. 4, pp. 615-622, (with Sejal Shah and Tarun Das).
- ☆ **Spectral decomposition theorem in equicontinuous nonautonomous discrete dynamical systems**, *Journal of Difference Equations and Applications*, 2016, Vol. 22, No. 5, pp. 676-686, (with Dhaval Thakkar).
- ☆ **On collective sensitivity for Z^d -actions**, *Dynamical Systems*, 2016, Vol. 31, No. 2, pp. 221-227, (with Sejal Shah).
- ☆ **A note on uniform entropy for maps having topological specification property**, *Applied General Topology*, 2016, Vol. 17, No. 2, pp. 123-127, (with Sejal Shah and Tarun Das).
- ☆ **A note on chaos for Z^D -action**, *Dynamics of Continuous, Discrete & Impulsive Systems. Series A. Mathematical Analysis*, 2015, Vol. 22, No. 2, pp. 95-103, (with Sejal Shah).
- ☆ **Some properties of chain recurrent sets in a nonautonomous discrete dynamical system**, *Advances in Pure and Applied Mathematics*, 2015, Vol. 6, No. 3, pp. 173- 178, (with Dhaval Thakkar).
- ☆ **Topological stability of a sequence of maps on a compact metric space**, *Bulletin of Mathematical Sciences*, 2014, Vol. 4, No. 1, pp. 99-111, (with Dhaval Thakkar).
- ☆ **On nonautonomous discrete dynamical systems**, *International Journal of Analysis*, 2014, Art. ID 538691, 6 pages, (with Dhaval Thakkar).

Member, Editorial Board

- ☆ **Asian-European Journal of Mathematics.**
- ☆ **Journal of Dynamical Systems and Geometric Theories.**

Research Guidance

Doctor of Philosophy

- Mukta Garg, University of Delhi
"Dynamics of Maps Possessing the Almost Average Shadowing Property and Variants of Transitivity"
- Radhika Vasisht, University of Delhi
"Variants of Transitivity, Sensitivity and Expansivity in Non-Autonomous Discrete Systems"

- Rahul Thakur, University of Delhi
"Continuous and Discrete Dynamical Systems"
- Mohammad Salman, University of Delhi
"Dynamics of Non-autonomous Discrete Systems"
- Dhaval Thakkar, The MS University of Baroda
"On Nonautonomous Discrete Dynamical Systems"
- Devender Kumar, University of Delhi (under progress)
"Qualitative study of Dynamical Systems"
- Arpit Mahajan, University of Delhi (under progress)
"Advances in Topological Dynamics"

Master of Philosophy

- Geeta Gupta, University of Delhi
"On topological entropy and chaos in nonautonomous discrete dynamical systems"
- Nikhil Kher, University of Delhi
"Dynamical properties of continuous flows"
- Mohammad Salman, University of Delhi
"Dynamical behaviour of maps in non-autonomous systems"

Awards/Grants

- UGC Major Research Project entitled *"On dynamical properties and chaotic behavior of maps"*
- Faculty Level Award at Faculty of Science, The MS University of Baroda, for publishing research paper in Mathematics with highest impact factor, 2012
- Short- term visitor, Mathematics Department, CNU, South Korea in 2007
- Greek Govt Scholarship at Department of Mathematics, University of Athens, Greece (2000-2001)
- Selected for Indo-Russian Scholarship for Post Doctoral Work in 1999
- UGC JRF and SRF for carrying out Doctoral Work

Invited Talks

Some selected ones ...

- Invited Talk: Chaos... from perspective of Nonautonomous Systems Symposium on Dynamical Systems, Department of Mathematics, University of Ladakh, Leh Aug 20, 2022
- Invited Talk: Sightseeing Chaos in Non Autonomous systems 3rd Conference on Algebra and Applications, School of Liberal Studies, Dr. BR Ambedkar University, Delhi, August 05, 2022
- Plenary Talk: Broadening Horizons of Transitivity and The Butterfly Effect in Dynamical Systems, Annual Conference of Indian Women and Mathematicians, March 2021

- Contributions from Indian Mathematicians at a glance, National Mathematics Day, H.P. University, Shimla, 2020
- Fixed Point Theorems in Topology, Refresher Course in Mathematics, Operational Research, Statistics and Computer Science, CPDHE, University of Delhi, 2019
- A journey with dynamical properties in dynamical systems, IWM Conference, Department of Mathematics, University of Delhi, South Campus, 2015
- Dynamics on G -spaces, Joint Research meeting of MSU Baroda and CNU Korea, The MS University of Baroda, 2013
- On generalization of expansivity, Joint Research meeting of MSU Baroda and CNU Korea, The MS University of Baroda, 2013
- Asymptotic points for a homeomorphism on a G -space ICTS supported International Discussion Meeting on recent trends in Ergodic Theory and Dynamical System, The MS University of Baroda, 2012
- Expansivity in different settings-I and II, ICTS supported International Workshop on recent trends in Ergodic Theory and Dynamical System, The MS University of Baroda, 2012
- Non-Linear System, Advanced Training School on Ordinary Differential Equations, 2011
- Linearization, Advanced Training School on Ordinary Differential Equations, 2011
- Structure of Discrete Dynamical Systems from view point of chain components and applications (Five Lectures), Dynamical Systems Seminar, CNU Korea, 2007
- Expansivity in Dynamical Systems (in different settings), Mathematics Colloquium Lecture, CNU Korea, 2007
- Topological Anosov maps, 67th Annual Conference of the Indian Mathematical Society, AMU, 2002
- Lectures on Expansivity in Dynamical Systems (8 Lectures), SAP project on Expansivity, HCU, 2001
- On homeomorphisms with expansive property, Invited Special Lecture, Department of Mathematics, University of Crete, Greece, 2001
- Expansiveness in Dynamical Systems I and II, Mathematical Analysis Seminars, University of Athens, Greece, 2000

Training Courses

- Refresher course in *Graph Theory* (3 weeks), Department of Mathematics, University of Chennai, Chennai, 2004
- Refresher course in *Algebra* (3 weeks), Department of Mathematics, University of Mysore, Mysore, 2003
- Refresher course in *Number Theory* (3 weeks), Department of Mathematics, University of Mumbai, Mumbai, 2002
- Winter School on *Transformation Groups* (3 weeks), Indian Statistical Institute, Kolkata, December 1998

Teaching Experience

- Have served as Lecturer, Reader, Associate Professor and Professor at the Department of Mathematics, The MS University of Baroda during 1996 - 2014. Currently serving as Professor at the Department of Mathematics, University of Delhi.
- Teaching / Taught M.A./M.Sc. Topology (first two courses) and Topological Dynamics at Department of Mathematics, University of Delhi since 2014.
- Teaching / Taught M.Phil/Ph.D. coursework *Dynamical Systems, Chaos Theory, Topology and Mixing* at Department of Mathematics, University of Delhi since 2014.
- Have taught several under-graduate and post-graduate classes at The MS University of Baroda, during 1993 - 2014 including *Algebra (Abstract and Linear), Analysis (Real, Complex, Functional), Differential Geometry, Topology, Advanced calculus, Number Theory, Linear Programming and Dynamical systems*

Administrative Activities

University of Delhi

- Member, Academic Council, University of Delhi.
- Ex-Dean, Faculty of Mathematical Sciences, University of Delhi.
- Head, Department of Mathematics, University of Delhi.
- Member of Standing Committee on Academic Matters of the Academic Council, University of Delhi.
- Served as Member of the Special Committee of the School of Physical Sciences of Jawaharlal Nehru University, 2017-2020.
- Ex-Chairperson, BRS, Faculty of Mathematical Sciences, University of Delhi.
- Chairperson DRC, Department of Mathematics and Chairperson M.Phil Committee, Department of Mathematics, University of Delhi.
- Member, committee constituted by the Competent Authority for preparation of syllabus, books for Indian Knowledge System (IKS) , University of Delhi.
- Member, Committee constituted for formulation of re-employment of research oriented academicians for promoting and strengthening the research culture in the University.
- Member, Committee constituted for formulation of re-employment of research oriented academicians for promoting and strengthening the research culture in DU colleges.
- Subject Expert on Mathematical Sciences; Inspire Fellowship, DST, Ministry of Science and Technology, Government of India.
- Member, Subject Expert Committee on Physical and Mathematical Sciences under Women Scientists Scheme-A, a flagship program of Department of Science and Technology
- Member, Subject Expert Committee (SEC) on Physical and Mathematical Sciences under WISE-PDF program of Department of Science and Technology (DST).
- Member, Board of Studies in Mathematics, H.P. University, Shimla
- Member, Board of Studies in Mathematics, Aligarh Muslim University

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The M.S. University of Baroda

- Have served as Head, Department of Mathematics, Faculty of Science
- Member, Board of Studies in Mathematics
- Member, Faculty Board, Faculty of Science
- Member, Departmental M.Phil Committee, Department of Mathematics
- Member, Departmental Research Committee, Department of Mathematics
- Convener, Syllabus Revision Committee (at UG Level), Department of Mathematics
- Member, Syllabus Revision Committee (at PG Level), Department of Mathematics
- Member, CBCS Implementation Committee, Faculty of Science
- Member, Annual Report Committee, Faculty of Science
- Member, IQAC Committee Faculty of Science