Dr. ANURAG SHUKLA

Assistant Professor
Department of Applied Science
Rajkiya Engineering College Kannauj
209 732,   Kannauj,   INDIA
Email: anuragshukla259@gmail.com
           anurag@reck.ac.in
Phone: +91 7895626850

Research Interests:

- **Mathematical Control Theory (MCT)**

  – Research area and current interest:
    * Controllability of Deterministic and Stochastic Integer Order Systems.
    * Controllability of Deterministic and Stochastic Fractional Order Systems.
    * Existence and Uniqueness of Solutions for Integer and Fractional Order Systems.
    * Stability analysis of Integer and Fractional Order Systems.
    * Optimal Control Problems for Nonlinear Control Systems.

Educational Qualification:

- **Indian Institute of Technology Roorkee, Roorkee (India)**
  Ph.D., Mathematics   *Jan. 2012 to May 2016*
  – **Title of Thesis:** Approximate Controllability of Semilinear Delay Control systems

- **Indian Institute of Technology Roorkee, Roorkee (India)**
  M.Sc., Mathematics (Grades/Marks: 8.52/10)   *2009-2011*

- **Kanpur University , Kanpur (India)**
  B.Sc. (Grades/Marks: 73.77%)   *2005-2008*
  – Graduated with Mathematics, Physics, Chemistry Subjects

- **U.P. Board, Allahabad (India)**
  Senior Secondary (science). (Grades/Marks: 83.40%)   *2003-2005*
  – Senior Secondary with Mathematics, Physics, Chemistry Subjects

- **UP Board, Allahabad (India)**
  Secondary. (Grades/Marks: 73.16%)   *2001-2003*

Teaching Experience:

1) Working as Assistant Professor in Department of Applied Science, Rajkiya Engineering College

Kannauj (A state government engineering college) since 08 Dec 2017.

2) Worked as Assistant Professor in Department of Mathematics, UPES Dehradun from 16 July 2016 to 07 Dec 2017.

3) Worked as a teaching assistant in the Department of Mathematics, IIT Roorkee from Jan 2012 to May 2016.

Research Experience:

-JRF in CSIR: Jan. 1, 2012 to Dec. 31, 2013

-SRF in CSIR: Jan. 1, 2014 to May. 13, 2016

Computer Skill:

- MS Office, Matlab, Mathematica, Latex, etc.

Memberships of Professional Bodies:

- Membership of SIAM Society of Industrial and Applied Mathematics.

Awards and Recognitions:

- **National Eligibility Test for Lectureship (NET)**

  June-2011

  - **Description:** National Eligibility Test (NET) is a national level test for determining the eligibility of the Indian national candidates for the award of Junior Research Fellowships (JRF) and for determining eligibility for appointment of lecturers in certain subject areas falling under the faculty of science. NET is conducted by Human Resource Development Group, Council of Scientific & Industrial Research, India.

- **Junior Research Fellowship (CSIR-JRF)**

  Jan. 2012- Dec. 2013

- **Graduate Aptitude Test for Engineering (GATE) with All India Rank-013**

  2011

  - **Description:** Graduate Aptitude Test in Engineering (GATE) is an all India examination conducted by the *Indian Institutes of Technology* and *Indian Institute of Science, Bangalore.* It identifies, at the national level, meritorious and motivated candidates for admission to post-graduate program in engineering/ technology/science/pharmacy.

- **Senior Research Fellowship (CSIR-SRF)**

  Jan. 2014 to 31 December 2015

- **IIT Roorkee Heritage Foundation (An Initiative of US Based Alumini)**

  – Description: Received Shyam and Pushp Garg Annual Excellence Award for Outstanding Academic, Co-Curricular and Extra Curricular Achievements on Nov. 13, 2010 at IIT Roorkee.

Research Publications:

- h-index: 7, Citations: 125.

- *Papers in Referred Journals:*

1. A. Shukla, N. Sukavanam and D. N. Pandey, Approximate controllability of semilinear system with state delay using sequence method, J. Franklin Inst. **352** (2015), no. 11, 5380–5392. MR3416770

2. Anurag Shukla, N. Sukavanam and D. N. Pandey, Approximate Controllability of Semilinear Fractional Control Systems of Order $\alpha \in (1,2]$ with Infinite Delay, Mediterr. J. Math. **13** (2016), no. 5, 2539–2550. MR3554260

3. A. Shukla et al., Approximate Controllability of Second-Order Semilinear Control System, Circuits Systems Signal Process. **35** (2016), no. 9, 3339–3354. MR3529759

4. A.Shukla et al., Approximate Controllability of Fractional Semilinear Stochastic System of Order $\alpha \in (1,2]$, Journal of Dynamical and Control Systems, Springer DOI:10.1007/s10883-016-9350-7.

5. Anurag Shukla, N. Sukavanam and D.N.Pandey, Controllability of semilinear stochastic control system with finite delay, IMA J Math Control Info (2016) doi: 10.1093/imamci/dnw059.

6. Anurag Shukla, U. Arora and N. Sukavanam, Approximate controllability of retarded semilinear stochastic system with non local conditions, J. Appl. Math. Comput. **49** (2015), no. 1-2, 513–527. MR3393792

7. Anurag Shukla, Rohit Patel, Controllability results for fractional semilinear delay control systems. J. Appl. Math. Comput. (2020). https://doi.org/10.1007/s12190-020-01418-4

8. Rohit Patel, Anurag Shukla, SS Jadon, Existence and optimal control problem for semilinear fractional order (1,2] control system. Math Meth Appl Sci. 2020; 1- 12. https://doi.org/10.1002/mma.6662

9. Anurag Shukla, N. Sukavanam and D. N. Pandey, Approximate controllability of second order semilinear stochastic system with nonlocal conditions, Ann. Univ. Ferrara Sez. VII Sci. Mat. **61** (2015), no. 2, 355–366. MR3421710

10. Anurag Shukla, N. Sukavanam and D.N.Pandey, Approximate Controllability of Semilinear Stochastic Control System with Nonlocal Conditions, Nonlinear Dynamics and Systems Theory **15** (2015), no. 3, 321–333.

11. Anurag Shukla, N. Sukavanam and D.N.Pandey, Complete Controllability of Semilinear Stochastic Systems with delay, Rendiconti del Circolo Matematico di Palermo DOI.10.1007/s12215-015-0191-0.

12. Anurag Shukla, N. Sukavanam and D.N.Pandey, Complete Controllability of Semilinear Stochastic Systems with delay in both state and control, Mathematical Reports 18(68), 2 (2016), 247-259.

13. Anurag Shukla, N. Sukavanam and D.N.Pandey, Approximate Controllability of Fractional Semilinear Control System of Order $\alpha \in (1,2]$ in Hilbert Spaces, Nonlinear Studies 22(1), 131-138, 2015.

14. Anurag Shukla, N. Sukavanam and D.N.Pandey, Approximate controllability of semilinear fractional stochastic control system. Asian-European Journal of Mathematics 11, no. 06 (2018): 1850088.

15. Anurag Shukla, N. Sukavanam and D.N.Pandey, Approximate controllability of semilinear stochastic system with multiple delays in control. Cogent Mathematics and Statistics 3, no. 1 (2016): 1234183.

- *Papers published in Conference:*

1. Anurag Shukla, N. Sukavanam and D.N.Pandey, Approximate Controllability of Semilinear Fractional Control Systems of Order $\alpha \in (1,2]$, SIAM Proceedings DOI:http://dx.doi.org/10.1137/1.9781611974072.25.

2. Anurag Shukla, N. Sukavanam and D.N.Pandey, Controllability of Semilinear Stochastic System with Multiple Delays in Control, IFAC proceedings volumes, Vol. 47, issue 1, 2014, 306-312.

3. Anurag Shukla, N. Sukavanam and D.N.Pandey, Approximate Controllability of Semilinear Stochastic System with State Delay, A book chapter in Mathematical Analysis and Its Applications (Springer), ISBN 978-81-322-2485-3

4. Anurag Shukla, N. Sukavanam and D.N.Pandey, Complete controllability of Impulsive Semilinear Stochastic Retarded System, IEEE proceedings.

5. A. Shukla, N Sukavanam and D.N.Pandey, Approximate Controllability of semilinear integrodifferential equations, SIAM PD 15, Arizona USA

Invited talk/Expert Lectures:

1. Delivered invited lecture on "Approximate Controllability of Semilinear Control Systems" in Tata Institute of Fundamental Research, Centre for Applicable Mathematics (TIFR-CAM) Banglore, 2015.

2. Delivered invited talk on "Controllability and Stability of Semilinear Control Systems" in National Conference on Computational and Characterization Techniques in Engineering and Sciences (CCTES-2019) held in REC Ambedkar Nagar.

3. Delivered Expert lectures on "Probability and Distributions" in REC Banda, 2019.

Research Praposal:

In present, I am working in Mathematical Control theory. In this field I obtained some sufficient conditions for controllability (Approximate, Complete, S-Controllability) of Integer order and Fractional Order systems (Deterministic, Fractional). Controllability is an important area in the study of control systems. The concept of controllability plays crucial role in analysis and the design of control systems. A control system is said to be controllable if every state corresponding to this process can be affected or controlled in respective time by some control signals. In many dynamical systems, it is possible to steer the dynamical system from an arbitrary initial state to an arbitrary final state using the set of admissible controls; that is, there are systems which are completely controllable. Before studying any system it is very important to know whether the system is controllable or not. If the system cannot be controlled completely then different types of controllability can be defined such as approximate, null, local null, local approximate null controllability, etc. In my past past research work I use the functional analysis and theory of Ordinary Differential Equations. Using fixed point theory, Gronwall's inequality and several known conditions on Nonlinear term, I obtained controllability results for nonlinear systems. Recently I have started work in Optimal Control theory. In this field I am studying the optimal control for nonlinear differential equations using theory of calculus of variation.

In future (next 3-5) years my aim to study controllability and optimality of fuzzy nonlinear deterministic systems, numerical techniques for solving the stochastic Controllability problems, Robustness of Control Problems and Stability of Control Problems.

Personal Details:

Name	:	Anurag Shukla
Date of Birth	:	15th August, 1989
Nationality	:	Indian
Sex	:	Male
Marital Status:	:	Married
Language Proficiency:		English /Hindi

References:

- Dr. N.Sukavanam,
  Professor,
  Department of Mathematics,
  Indian Institute of Technology
  Roorkee-247667
  Phone: +91 1332 285341 (Office)
  Email: nsukvfma@iitr.ac.in

- Dr. D.N.Pandey,
  Assistant Professor,
  Department of Mathematics,
  Indian Institute of Technology,
  Roorkee-247667
  Phone: +91 1332 285735 (Office)
  Email: dwijpfma@iitr.ac.in

I hereby declare that the above statements made by me are true to the best of my knowledge and belief.

Date: 15.10.2020
Place: Kannauj   **(Anurag Shukla)**