Dr. Sushil Kumar

Assistant Professor
Department of Applied Mathematics & Humanities
S.V.National Institute of Technology Surat, Gujrat, India
Phone: +91 0261 2201761 (O); +91 0261 2201875(R); +91 7228009980(M)
E-mail: sushilk@amhd.svnit.ac.in, skumar.iitr@gmail.com,

Field of Interest:

Mathematical Modeling and Simulation, Biomechanics, Moving Boundary Problems, Heat Transfer, Fractional Differential equations, Numerical Solution, Radial Basis Functions, Chebyshev Polynomials

Recent work

Numerical Solution of partial and fractional differential equations using Chebyshev polynomials and Radial basis functions.

Selected Publications

(i). Dual phase lag bio-heat transfer during cryosurgery of lung cancer: comparison of three heat transfer models, Journal of Thermal Biology, Volume 69, October 2017, pp 228–237. (with Ajay Kumar, Prof. V. K. Katiyar and Shirley Telles)

(ii). Phase change heat transfer during cryosurgery of lung cancer using hyperbolic heat conduction model, Computer in Biology and Medicine, Volume 84, 1May 2107, pp 20-29 (with Ajay Kumar, Prof. V. K. Katiyar and Shirley Telles)

(iii). Fuzzy Similarity Measure Based Spectral Clustering Framework for Noisy Image Segmentation, International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems, Vol. 25, No. 4 (**2017**) 649–673 (with Subhanshu Goyal, M. A. Zaveri, A. K. Shukla)

(iv). Solution of fractional bioheat equation in terms of Fox's H-function, *Springer Plus* (2016) 5:111 (with R. S. Damor and A. K. Shukla)

(v). Numerical analysis of triple layer skin tissue freezing using non-Fourier heat conduction, *Journal of Mechanics in Medicine and Biology*, Volume 16, Issue 02, March 2016. (with Sonalika Singh)

(vi). Freezing of biological tissues during cryosurgery using hyperbolic heat conduction model, Mathematical Modelling and Analysis, Vol 20 (4), 2015, pp 443-456. (with Sonalika Singh)

(vii). A Survey on graph partitioning approach to spectral clustering, Journal of Computer Science & Cybernetics, Vol 20, Issue 4, (**2015**), 443-456 (with Subhanshu Goyal, M. A. Zaveri, A. K. Shukla)

(viii). Numerical study on triple layer skin tissue freezing using dual phase lag bio heat model, *International Journal of Thermal Science*, Vol 86, 2014, pp 12-20. (with Sonalika Singh)

(ix). Temperature distribution in living tissue with fractional bio-heat model in thermal therapy, Proceedings of *International Conference on Advances in Tribology and Engineering Systems*, Springer India, 2014, pp 493-498 (with Ramesh S Damor and A K Shukla)

(x). A study on the effect of metabolic heat generation on biological tissue freezing, *The Scientific World Journal*, Article ID 398386, 2013, 7 pages. (with Sonalika Singh)

(xi). Numerical simulation of fractional bio heat equation in hyperthermia treatment, *Journal of Mechanics in Medicine and Biology*, Vol 14, No. 2 (2014), World Scientific Publication. (with Ramesh S Damor and A K Shukla)

(xii). Numerical solution of fractional diffusion equation model for freezing in finite media, *International Journal of Engineering Mathematics*, 2013 (Article ID 785609), 8 pages (with Ramesh S Damor and A K Shukla)

(xiii). Numerical Solution of Fractional Bioheat Equation with Constant and Sinusoidal Heat Flux Condition on Skin Tissue, American Journal of Mathematical Analysis Vol 1, No. 2 (2013): 20-24. (with Ramesh S Damor and A K Shukla)

(xiv). Mathematical modeling of freezing and thawing process in tissues: a porous media approach, *International Journal of Applied Mechanics, vol. 2, no. 3 (2010) pp617–633 (with V. K. Katiyar)*

(xv). Numerical modeling of pulsatile flow of blood through a stenosed tapered artery under periodic body acceleration, *Journal of Mechanics in Medicine and Biology,* Vol. 10, No. 2 (2010) 251–272. *(*with G. Varshney and V. K. Katiyar)

(xvi). Effect of magnetic field on the blood flow in artery having multiple stenosis:a numerical study, *International Journal of Engineering, Science and Technology, Vol. 2, No. 2 (2010), pp. 67-82(with Prof. V. K. Katiyar and Gaurav Varshney)*

(xvii). Mathematical Modeling of Pulsatile Blood Flow and Heat Transfer Characteristics in Stenosed Artery, *International Journal of Fluid Mechanics Research*, Vol. 37, No. 4, (2010) *pp*305-324 *(*with G. Varshney and V. K. Katiyar)

(xviii). Transient analysis on alloy freezing in finite media with energy generation and convective cooling, *International Journal of Applied Mechanics and Engineering*, Vol 15, No. 4 (2010) *pp*1155-1168 *(*with V. K. Katiyar*)*

(xix). Mathematical modeling of thawing problem in skin and subcutaneous Tissue, in C.T. Lim and J.C.H. Goh (Eds.): WCB 2010, *IFMBE Proceedings* 31, (2010) pp. 1611–1614, *(*with V. K. Katiyar*)*

(xx). Numerical simulation of thawing process of biological tissues as porous media during cryosurgery, *presented in 5th world congress on Biomechanics, Munich (Germany) from July, 29 to Aug 4, 2006. Abstract in: Journal of Biomechanics Vol-39 Supp 1(2006) pp S384 (*with Prof. V. K. Katiyar*)*

(xxi). Numerical Study on Phase Change Heat Transfer During Combined Hyperthermia and Cryosurgical Treatment of Lung Cancer, International Journal of Applied Mathematics and Mechanics Vol 3, Issue 3, (2007) pp 1-17, (with Prof. V. K. Katiyar)

(xxii). Mathematical Modeling and Numerical Simulation of Drug Release in Stented Artery, International Journal of Applied Mathematics and Mechanics, Vol 4, Issue 1, (2008) pp 91-102. *(*with G. Varshney and V. K. Katiyar)

Dissertation Guided

***Master of Science*:** 8

***Master of Philosophy*:** Guided 7 dissertations

Ph. D.: Continued- 02.
Submitted: 01

1. *Mr. Subhanshu Goyal*: Spectral Clustring Algorithm with Efficient Similarity Matrix Construction Variants for Noisy Image Segmentation.

Completed- 02:

1. *Dr. Ramesh S Damor*: Studies on Heat Transfer in Biological Tissue: A Fractional Calculus Approach.

2. *Dr. Sonalika Singh*: Mathematical Modelling of Phase Change Process Using Non-Fourier Heat Transfer.

Conference & Workshop Attended: 20

Membership of Professional Bodies

(i). Life Member of International Association of Engineers (IAENG). Membership No. – 65259
(ii). Life Member of Indian Mathematical Society, Membership No. L /2011/22
(iii). Life Member of Indian Science Congress Association. Membership No. -L16911
(iv). Life member of Indian Society of Biomechanics
(v). Life member of Indian Society of Theoretical and Applied Mechanics, Membership No.- L/731
(vi). Life member of International Academy of Physical Sciences, Membership No.– N12201

Teaching & Research Experience

21st may 2009 – continued : Assistant Professor, Department of Applied Mathematics & Humanities, S.V. National Institute of Technology Surat

26th March 2007- 16th May 2009 : Lecturer in University Institute of Engineering and Technology, CSJM University Kanpur, UP- 208024.

26th March 2002-23rd March 2007 : Tutorial Classes and Computer Lab. of M. Sc., M.C.A. and M. Tech. at I.I.T. Roorkee during Ph.D.

Subject Taught

Partial Differential Equations and Their Applications	: In M. Sc. at SVNIT Surat
Numerical Analysis	: Tutorial class in M. Tech. at IIT Roorkee during Ph.D. and computer lab in M.Sc. : In M. Sc at SVNIT Surat
Mathematical Modelling	: Tutorial class in M.Sc. and M.C.A At IIT Roorkee During Ph.D and Lecture class in M.Phil. at UIET, CSJM University Kanpur.
C++	: Computer lab in M.Sc. during Ph.D.
Engineering Mathematics I, II & III	: In B. Tech. at UIET, CSJM University Kanpur. : In B. Tech. at SVNIT Surat.

Administrative Responsibilities

(i) Member, Hindi Cell, SVNIT Surat India
(ii) Joint Secretary, SVR School committee, SVNIT Surat India
(iii) Lab-In- Charge, Applied Mathematics & Humanities Department, SVNIT Surat, India
(iv) Member, Time Table committee, Applied Mathematics & Humanities Department, SVNIT Surat, India

Education

Ph.D. in Mathematics (Nov-2007)
Department of Mathematics
Indian Institute of Technology Roorkee, Roorkee (India)
Thesis title: "Mathematical Modelling of Solidification Processes"

M.Sc. in Industrial Mathematics and Informatics (2001):
C.G.P.A- 7.76 (On 10-point scale)
Indian Institute of Technology Roorkee, Roorkee (India)

B.Sc. in Physics, Chemistry and Mathematics (1998):
Marks: 75.4%
Sahu Jain College Najibabad, M. J. P. Rohilkhand University, Bareilly. (India)

Intermediate (10+2), Physics, Chemistry, Mathematics, English, Hindi, (1995):
Marks: 75.8%
M.D.S. Inter College Najibabad, Distt- Bijnor, U.P. Board Allahabad (India).

High School (10), Science-2, Maths-2, Biology, Social Sc., English, Hindi, (1993):
Marks: 67.83%
Inter College Newalgoan (Harara) Almora, U.P. Board Allahabad (India).

Dissertation /Thesis

*(i). **M. Sc. Dissertation***

Title: "Simulation of a PERT Network**"**

Advisor: Prof. Sunita Gakkhar,

Department of Mathematics, Indian Institute of Technology Roorkee, Roorkee

- Simulated the PERT (Program Evaluation and Review Technique) Network which occurs in scheduling of any project using C++ computer language.

(ii). ***Ph. D. Thesis***

Title: "Mathematical Modelling of Solidification Processes"

Advisor: Prof. V.K. Katiyar

Department of Mathematics, Indian Institute of Technology Roorkee**,** Roorkee

- Partial Differential Equations to model some problems related to solidification in biology (Cryosurgery) and alloy.
- Numerical Method using Finite Difference Method.
- MATLAB, C++

National Level Achievements

(i). GATE 2001 Percentile Score-82.66 All India Rank – 148th

(ii). NET July 2001 CSIR-UGC Test for JRF & Eligibility for Lectureship (CSIR)

(iii). NET Dec 2001 CSIR-UGC Test for JRF & Eligibility for Lectureship (CSIR)

(iv). GATE 2002 Percentile Score 98.33 All India Rank – 18th

(v). NET Jun 2002 CSIR-UGC Test for JRF & Eligibility for Lectureship (CSIR)

Scholastic Achievements

(i). Awarded with National Scholarship in Graduation.

(ii). Awarded with half free-ship for securing Second rank in class in M. Sc. at IIT Roorkee.

(iii). MHRD Fellowship from 26th March, 2002 to 30th Nov, 2002.

(iv). CSIR-JRF from 1st Dec 2002 to 30th Nov 2004.

(v). CSIR-SRF from 1st Dec 2004 to 23rd March 2007.

Foreign Visits

(i) Michigan Technological University, Houghton, USA, for research collaboration with Dr. Cecile M Piret, on "Solution of fractional differential equations using Radial basis functions", during Sept 15-Oct 7, 2016.

(ii) Washington DC, USA , to present research paper at Spring 2012 Eastern Sectional Meeting of the "American Mathematical Society (AMS)" during March 17-18, 2012

(iii) Asian Institute of Technology Thailand during Sept 26-28, 2011.

(iv) Munich, Germany, to present research paper at **"**5tth World Congress on Biomechanics**"**, from July-29 to August-04, 2005.

Personal Details

(i).	Father's Name	: Shri Teekam Singh
(ii).	Date of Birth	: February 23, 1979
(iii).	Nationality	: Indian
(iv).	Marital status	: Married
(v).	Language proficiency	: Hindi and English
(vi).	Address for Communication	: Assistant Professor Department of Applied Mathematics & Humanities S.V. National Institute of Technology Surat (Ichchhanath), Surat-395007, Gujarat, India
(vii).	Permanent Address	: Vill. - Mehmudpur Bhawta, Post – Kotwali Dehat, Nagina, Distt. - Bijnor (U.P.), India- 246764