

Dr. Sushil Kumar



Assistant Professor

Department of Applied Mathematics & Humanities

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Field of Interest

Numerical Analysis, Moving Boundary Problems, Heat Transfer, Mathematical Modeling and Simulation, Biomechanics, Fractional Differential Equations

Selected Publications

- (i). 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)
- (ii). 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)
- (iii). Freezing of Biological Tissues during Cryosurgery Using Hyperbolic Heat Conduction Model, *Mathematical Modelling and Analysis*, Vol 20 (4), pp 443-456. (with Sonalika Singh)
- (iv). 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)
- (v). 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)
- (vi). 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)
- (vii). 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, pp 20-24. (with Ramesh S Damor and A K Shukla)
- (viii). 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)
- (ix). Numerical simulation of fractional bio heat equation in hyperthermia treatment, *Journal of Mechanics in Medicine and Biology*, Vol 14 (2014), World Scientific Publication. (with Ramesh S Damor and A K Shukla)
- (x). 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)

- (xi). 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)
- (xii). 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) pp1155-1168 (with V. K. Katiyar)
- (xiii). Mathematical Modeling of Pulsatile Blood Flow and Heat Transfer Characteristics in Stenosed Artery, *International Journal of Fluid Mechanics Research*, Vol. 37, No. 4, (2010) pp305-324 (with G. Varshney and V. K. Katiyar:
- (xiv). 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)
- (xv). 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)
- (xvi). 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)
- (xvii). A solution of a fractional bio heat equation in term of h-function (Communicated) (with Ramesh S Damor and A K Shukla)
- (xviii). Solutions of Dual Phase Lag Bio-Heat Equation during Biological Tissue Freezing, (Communicated). (with Sonalika Singh)
- (xix). Numerical thermal analysis of triple layer skin tissue using fractional bio heat model (communicated). (with Ramesh S Damor and A K Shukla)

Dissertation Guided

Master of Science: 5

Master of Philosophy: Guided 5 dissertations

Ph. D.: Continued- 03.
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 Jun2002 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) Munich, Germany, to present research paper at “5th World Congress on Biomechanics”, from July-29 to August-04, 2005.
- (ii) Asian Institute of Technology Thailand during Sept 26-28, 2011.
- (iii) Washington DC, USA , to present research paper at Spring 2012 Eastern Sectional Meeting of the “American Mathematical Society (AMS)” during March 17-18, 2012

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
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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