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BOOK OF ABSTRACTS FOR

Plenary Address / Keynote Address / Invited Talks

Department of Mathematics and Computer Science (DMACS),
Sri Sathya Sai Institute of Higher Learning (SSSIHL)

Prof B. Raghavendra Prasad

Vice-Chancellor – SSSIHL

INAUGURAL ADDRESS

Brief Bio

Prof. B. Raghavendra Prasad, the 12th Vice-Chancellor of SSSIHL, is an accomplished scientist with a background in physics and astronomy. He joined the Indian Institute of Science and later the Indian Institute of Astrophysics, where he led significant projects in astronomy and established R&D facilities. Prof. Prasad played a pivotal role in the development of India's first space solar observatory, VELC-AdityaL1, and served as the Principal Investigator for the mission. He has held numerous positions on scientific committees and assessment boards, contributing to the advancement of research and academic institutions. Prof. Prasad's expertise and leadership have made significant contributions to the field of solar astronomy and space weather prediction.

Prof. Arni S.R. Srinivasa Rao

Professor and Director
Laboratory for Theory and Mathematical Modeling,
Medical College of Georgia, U.S.A.

Plenary Talk

Title of the talk: Mathematical Modeling as a National Health Planning Tool in India

Date - 20-07-2023 | **Time -** 9:25 am – 10:10 am

Brief Bio

Arni S. R. Srinivasa Rao is a tenured Full Professor and Director of the Laboratory for Theory and Mathematical Modeling at the Medical College of Georgia, Augusta, USA. With a prestigious background at institutions such as the Indian Statistical Institute and the University of Oxford, Dr. Rao's research has received extensive media coverage and he has delivered over 55 invited talks and seminars worldwide. His notable contributions encompass mathematical modeling in public health, including AIDS control planning, Bird Flu, and Swine Flu. Dr. Rao is recognized for his pioneering work in developing the world's first AI-based model for COVID-19 identification using mobile-based apps. He has edited volumes, guest-edited special issues, and served on editorial boards for esteemed journals, demonstrating his expertise in statistics and mathematics..

Abstract of the Talk

Mathematical Modeling has been an invaluable tool in health and disease planning and policy formulations. During the talk, the speaker will summarize various personal experiences of building models that were collaborated with policy experts, doctors, and public health experts in India and how they assisted in national healthcare planning.

Prof. B. V. Rathish Kumar

Department of Mathematics and Statistics
IIT Kanpur

Keynote Address

Title of Talk - Stabilized Variational Multiscale Sub-Grid Finite Element Analysis Transport Model with Application to Hemodyanics

Date - 20-07-2023 **| Time -** 10:40 am - 11:20 am

Brief Bio

Dr. B.V.Rathish Kumar is a professor in Department of Mathematics from IIT Kanpur. He did his PhD in Mathematics from Sri Sathya Sai Institute of Higher Learning, Andhra Pradesh, India. He works in the fields of Numerical Analysis, Applied Mathematics, Scientific Computing, computational Biomechanics, PDEs, CFD, HPC, Image Processing. He has published in various national and international journals. He is also a recipient of multiple awards in the field of Mathematical Biology. He served as a President for Indian Society Of Theoretical and Applied Mechanics(ISTAM). He served as a Member of the National Advisory Committee for National Programme for Differential Equations: Theory, Computation &Application, IIT Bombay under the aegis of DST, Govt. of India, 2011-2016.

Abstract of the Talk

In this talk, I will introduce the concept of variational multiscale Sub-Grid Finite Element Analysis for fluid flows problems. I will also introduce the notion of apriori and aposteriori error analysis for Finite Element Method in the context of transport models. Then carry forward these concepts to Darcy-Stokes Model. Further the notion of stabilized Variational Multiscale Sub-Grid Finite Element Method (VMSGFEM) for transport equations, which is especially helpful to handle convection dominated fluid flows will be dealt with and then will extend the same to the unified Brinkman-Stokes/Transport Model. Results from the numerical test cases will also be introduced. Application of the method for computing blood flow in complex arterial geometries will be presented.

Dr. Prashant Kumar Srivastava

Department of Mathematics
IIT Patna

Invited Talk

Title of the talk - Bifurcation Analysis of a Predator-prey Model with Allee Effect and Fear Effect in Prey and Hunting Cooperation in Predator

Date - 20-07-2023 **| Time -** 11:20 am - 11:50 am

Brief Bio

Dr. Prashant K. Srivastava is working as an Associate Professor and Head at present in the Department of Mathematics, Indian Institute of Technology Patna, India. His research area is mathematical modeling in ecology and epidemiology. In particular, his interest lies in modeling behavioural response and non-pharmaceutical interventions and their optimal controls in infectious disease dynamics. He is also interested in exploring nonlinear dynamical behavior in infectious disease models. Dr. Srivastava has more than 18 years of teaching and research experience.

Abstract of the Talk

Mathematical modeling of predator-prey interactions helps us understand their mechanisms, make informed management decisions, and estimate ecological system dynamics. In this study, we investigated a predator-prey model with fear and Allee effects in prey, as well as hunting cooperation in predators. They established the well-posedness of the system and analyzed the existence and stability of equilibrium points under weak and strong Allee effects. Various bifurcations were observed, including saddle-node, transcritical, and Hopf bifurcations. Numerical simulations highlighted the crucial role of predator conversion rate in stability switching. Fear had both stabilizing and destabilizing effects depending on hunting cooperation and predator efficiency. The system exhibited persistence or bistability with the weak Allee effect and bistability and tristability with the strong Allee effect. Increasing hunting cooperation led to a decrease in prey density, while excessive cooperation could drive species to extinction. However, under the weak Allee effect, high hunting cooperation was sustainable if predator conversion exceeded mortality rate. Findings provide valuable insights for estimating species behavior and population management.

Dr. Ritesh Kumar Dubey

Department of Mathematics
SRMIST, Chennai

Invited Talk

Title of the talk: Entropy stable non-oscillatory fluxes: An optimized wedding of entropy conservative flux with non-oscillatory flux.

Date - 20-07-2023 | **Time -** 1:30 pm – 2:00 pm

Brief Bio

Dr. Dubey works in the field of Numerical analysis, scientific computing and deep learning. He has a specialization in data dependent analysis, high order shock-capturing schemes, Deep learning for image analytics and XAI. He has authored/co-authored papers in the high impact journals of international repute such as SIAM Journal on Scientific Computing, Journal of Computational Physics, Applied Mathematics and Computation, and Advances in Computational Mathematics, etc. He has undertaken various funded research projects from government and industry. He also participated in ICM 2014 (Seoul) and ICIAM 2019 (Valencia) as a part of the prestigious Indian delegations selected by the National Board for Higher Mathematics (DAE). As a part of professional activities, he is a member of various Indian Science societies. He is actively serving as a reviewer for various mathematical journals of international repute and submitted funded projects.

Abstract of the Talk

This work frames the problem of constructing non-oscillatory entropy stable fluxes as a least square optimization problem. A flux sign stability condition is defined for a pair of entropy conservative flux and a non-oscillatory flux. This novel approach paves a way to construct non-oscillatory entropy stable flux as a simple combination of the entropy conservative flux and non-oscillatory flux, which inherently optimizes the numerical diffusion in the entropy stable flux. This robust approach is agnostic to the choice of flux pair, does not require the computation of costly dissipation operator and high order reconstruction of scaled entropy variable to construct the diffusion term. Various non-oscillatory entropy stable fluxes are constructed, and exhaustive computational results for standard test problems are given, which show that these entropy stable schemes completely remove spurious oscillations in approximating the discontinuities compared to the non-oscillatory schemes using underlying fluxes only. Moreover, these entropy stable schemes maintain the formal order of accuracy of the lower order flux in the pair.

Dr. S R V Prasad Bhuvanagiri

Department of Mathematics,
School of Advanced Sciences
VIT Vellore

Invited Talk

Benefits and Drawbacks of Polyphagy in Natural Enemies and Pests in the Context of Biological Control: A Theoretical

Date - 20-07-2023 | **Time -** 2:00 pm – 2:30 pm

Brief Bio

Dr. B.S.R.V. Prasad completed his master's degree in Mathematics in 2002 and worked as a Lecturer at Andhra Loyola College until 2005. He pursued research in Mathematical Ecology/Biology and obtained his doctoral degree in Mathematics in 2011. His research focused on prey-predator interactions and mathematical modeling for biological control/conservation. He also collaborated on a project studying the Chilka Lake Ecosystem. He served as a UGC-DS Kothari Post-Doctoral Fellow at Visva-Bharati University and joined Vellore Institute of Technology as an Assistant Professor in 2012. Currently, he is an Associate Professor and has received the Young Scientist Project Award from DST, India. He has published in prestigious journals, delivered invited talks at national/international events, and presented his work in various countries.

Abstract of the Talk

Biological control is an eco-friendly strategy that uses natural enemies to suppress pests or weeds, reducing the need for chemical products. Generalist predators, chosen for their broad diet, play a key role in controlling pest populations. However, their feeding behavior includes consuming non-prey sources like pollen and plant tissue. Supplementary food can enhance the number and effectiveness of natural enemies, but its success depends on the quality and quantity provided. Factors such as competition, cannibalism, and anti-predator behavior also influence biological control outcomes. In this presentation, the speaker will review theoretical and mathematical modeling of interactions between natural enemies and pests, considering the impact of supplementary food and other factors. The potential of mathematical modeling to improve biological control tactics for polyphagous pests will be explored.

Dr. Nitu Kumari

School of Basic Sciences
IIT Mandi

Invited Talk

Title of Talk - Understanding Dynamics of COVID-19 in India using Data Driven Model

Date - 20-07-2023 | **Time -** 2:30 pm – 3:00 pm

Brief Bio

Nitu Kumari is an Associate Professor of Applied Mathematics at the Indian Institute of Technology Mandi in Himachal Pradesh, India. She is a Raman Fellow and holds a PhD in Applied Mathematics from the Indian Institute of Technology (ISM) Dhanbad, along with an MPhil and MSc in Applied Mathematics from the same institution. Her research focuses on mathematical biology and ecological modeling, including topics such as infectious disease dynamics, pattern formation, and the impact of pollution on disease spread. Nitu Kumari has received various awards and research grants, and her work has been published in international peer-reviewed journals. She also has teaching experience in mathematics-related courses at IIT Mandi.

Abstract of the Talk

The COVID-19 pandemic had a profound impact on India's health and economy. To effectively control the outbreak, understanding the spatio-temporal patterns of disease spread is crucial. In our study, utilization of CwDMD and DMD techniques on India's COVID-19 data is done to model these patterns. By decomposing the data into spatial-temporal modes, we extracted key insights into the complex dynamics driven by regional, demographic, and environmental factors. Our analysis revealed seasonal fluctuations, demographic trends, and localized outbreaks, providing valuable information for public health organizations to devise targeted strategies. The successful application of CwDMD and DMD methods in India opens up possibilities for their implementation in other countries, enabling the identification of unique drivers and the development of effective control strategies tailored to each region's needs.

Dr. Jai Prakash Tripathi

Department of Mathematics
Central University of Rajasthan

Invited Talk

Title of Talk - Population Interactive Models and Biocontrol

Date - 21-07-2023 **| Time -** 9:15 am – 9:45 am

Brief Bio

Dr. Jai Prakash Tripathi is an Assistant Professor at the Central University of Rajasthan, specializing in Mathematical Biology, Theoretical Ecology, and Epidemiology. With a PhD in Mathematical Ecology, he leads a research group that explores population and ecosystem interactions using diverse modeling approaches. Dr. Tripathi has supervised numerous students, published extensively in reputable journals, and organized international panel discussions. He is an active member of professional societies, including the Society of Mathematical Biology and the Indian Mathematical Society, and serves as a reviewer for esteemed journals such as JMB, JMAA, and Nature Communications.

Abstract of the Talk

The present work explores the dynamics of a cannibalistic predator-prey model using the theory of dynamical systems. The study focuses on the impact of additional food resources and different harvesting schemes on pest control. Results indicate that providing additional food and implementing linear harvesting schemes are effective in reducing pest population density and achieving eradication. The research suggests threshold values for harvesting and optimal choices of additional food for successful biological control programs. Mathematical analysis and numerical evaluations are provided to support the findings.

Dr. D. K. K. Vamsi

DMACS-SSSIHL

Research Musings from DMACS-SSSIHL

Session – I

Title of Talk - Applicability of Mathematical Biology – The Road Less Traversed
A Journey from Theory to Applicability

Date - 21-07-2023 | **Time -** 9:45 am – 10:15 am

Brief Bio

Dr. D. K. K. Vamsi leads the Mathematical Modeling group of DMACS, focusing on ecological and epidemiological modeling for societal benefits. Their research includes Additional Food Provided Prey-Predator Systems for Pest control and Biological Conservation. They also model the spread and dynamics of diseases like Dengue, Leprosy, and COVID-19. Their work addresses optimal vaccination strategies, medication for age-stratified populations, and optimal drug dosage and regimen for patient recovery. The team has publications in reputable national and international journals, presented findings at conferences and workshops, and received Young Scientist awards. They are currently working on two government-funded projects from CSIR and NBHM.

Abstract of the Talk

Mathematical models have been used to predict the behavior of physical and biological systems and to define strategies aimed at minimizing the impact on different types of diseases. Mathematical modeling of infectious diseases has contributed to a better understanding of the dynamic behavior of diseases and their effects. These models are used to compare, plan, implement, evaluate and optimize different detection, prevention, treatment, and control strategies. But most of the research in math biology stays at a theoretical and publication level. The real power of the math modeling comes from the practical utility and applicability of the findings. To dwell more on this aspect in this talk we intend to present the findings of our modeling group from DMACS dealing with the motivations, conceptualizations, simulations and applications. We propose to discuss these findings in the context of Hansen's, Tuberculosis and COVID-19 diseases.

Mr. D. Bhanu Prakash

DMACS-SSSIHL

Research Musings from DMACS-SSSIHL
Session – I

Title of Talk - Deterministic and Stochastic Studies on Additional Food provided Prey-Predator Models involving Holling type III and Holling type IV Functional Responses

Date - 21-07-2023 **| Time -** 10:15 am – 10:30 am

Brief Bio

Mr. Bhanu Prakash D is a Doctoral Research Scholar in the Department of Mathematics and Computer Science, Sri Sathya Sai Institute of Higher Learning, Andhra Pradesh, India. He is currently working as Junior Research Fellow (JRF) for an Department of Atomic Energy - National Board of Higher Mathematics (DAE-NBHM) funded project titled "Time-Optimal Control Studies and Bifurcation Analysis of Coupled Non-Linear Dynamical Systems with Applications to Pest Management". He is working under the supervision of Dr. Krishna Kiran Vamsi Dasu. Mr. Bhanu Prakash has published 9 papers and 1 paper is under-review.

Abstract of the Talk

Provision of additional food supplements for the purpose of biological conservation has been widely researched both theoretically and experimentally. The study of these biosystems is usually done using predator–prey models. We consider two additional food-provided predator–prey systems exhibiting Holling type-III and Holling type-IV functional responses respectively. These models are analysed in the control parameter space using the control parameters, quality and quantity of additional food. The findings suggest that with appropriate choice of additional food to predators, the biosystem can be controlled and steered to a desirable state. It is also possible to eliminate either of the interacting species. We also modified these models by perturbing a couple of parameters with noise. These stochastic models are also analysed in the control parameter space using the both control parameters. The vital role of the quality and quantity of the additional food in the system dynamics cautions the eco manager on the choice of the additional food for realising the goal in the biological conservation programme

Dr. N. Uday Kiran

DMACS-SSSIHL

Research Musings from DMACS-SSIHL
Session – II

Title of Talk - Other DMACS Research Areas

Date - 21-07-2023 **| Time -** 10:50 am - 11:30 am

Brief Bio

Dr. Uday Kiran Nori is an expert in Mathematical Analysis. He is interested in diverse fields of mathematical analysis that include microlocal analysis, functional analysis and algebraic analysis. He uses these methods to study the behaviour of differential equations, generating functions and medical images. He is actively involved in research work along with full-time teaching duties. He also loves teaching students the art of problem solving through puzzles, games and anecdotes.

Dr. Bapan Ghosh

Department of Mathematics
IIT Indore

Invited Talk

Title of Talk - Bifurcations, Triple and Quadruple attractors, and organized periodic structures in a discrete-time predator-prey system

Date - 21-07-2023 **| Time -** 11:30 am - 12:00 pm

Brief Bio

Bapan Ghosh is an Assistant Professor at IIT Indore, specializing in Applied Dynamical Systems and Mathematical Ecology. He holds an M.Sc. in Applied Mathematics and a PhD from IIEST, Shibpur. With over 30 international journal papers and research experience in France, Taiwan, and Russia, Bapan has received prestigious grants and awards for his work. He has supervised multiple PhD students and serves as an Academic Editor for the Journal of Computational and Mathematical Methods in Medicine (Hindawi), an Editorial Board Member for Communication in Biomathematical Sciences (Indonesian Bio-Mathematical Society), and a Guest Editor for special topics in renowned journals.

Abstract of the Talk

This paper investigates a discrete-time system derived from the continuous-time Rosenzweig-MacArthur (RM) model. Varying carrying capacity and harvesting efforts reveal complex phenomena like periodicity, quasiperiodicity, period-doubling, period-bubbling, and chaos. Analysis shows that the prey species' carrying capacity can stabilize or destabilize the system through flip and Neimark-Sacker bifurcations, in contrast to the continuous-time RM model. Multistabilities, including bistable, tristable, and Quadruple attractors, are observed. Ecological implications of prey species enrichment on predator abundance are explored. Bi-parameter space analysis of prey and predator harvesting efforts uncovers organized periodic structures with period-adding, frequency-locking, Arnold tongues, and shrimp-like structures. Discussions on ecological interpretations of predator harvesting, such as mean densities, highlight the paradoxical hydra effect.

Dr. P. Muthu

Department of Mathematics
NIT Warangal

Invited Talk

Title of Talk - Stability of a within-host model of dengue virus transmission

Date - 21-07-2023 | **Time -** 2:00 pm – 2:30 pm

Brief Bio

P. Muthu is an Associate Professor at N.I.T. Warangal, holding a Ph.D. in Mathematics from I.I.T. Kanpur. With extensive research and teaching experience, he specializes in fluid mechanics, numerical methods, and biomechanics. Muthu has held academic positions, taught diverse courses, reviewed journals, and organized workshops. He has contributed to program activities, fulfilled administrative roles, chaired conference sessions, mentored students, and participated in research projects. His research papers cover peristaltic motion, micropolar fluid flow, and mathematical models of fluid flow. His interests span fluid dynamics, biomechanics, numerical analysis, computational simulation, and more. During his Ph.D., he focused on mathematical modeling and solutions of differential equations. Muthu has received awards, delivered talks, and is actively involved in mathematical and scientific societies.

Abstract of the Talk

In this talk, we discuss the stability of a within-host model of dengue virus transmission. The basic reproduction number (BRN) is introduced using the next generation matrix method. The two equilibrium states, namely, the virus-free equilibrium state and the endemic equilibrium state, are analysed in terms of their local stability using the method of linearization. The Lyapunov's direct method is used to check the global stability of the equilibrium states of the system. To illustrate the behaviour of the system, numerical simulations have been performed and explained by graphs. Further, to see the effect of various parameters on the system, the sensitivity analysis is done. It has been found that the virus-free equilibrium is globally asymptotically stable if BRN ≤ 1 and the endemic equilibrium is globally asymptotically stable if BRN > 1.

Prof. Mini Ghosh

Department of Mathematics
VIT – Chennai

Invited Talk

Title of Talk - Mathematical Modeling of COVID-19

Date - 21-07-2023 | **Time -** 2:30 pm – 3:00 pm

Brief Bio

Mini Ghosh is a Professor at the School of Advanced Sciences, Vellore Institute of Technology, Chennai Campus, India. She received her Ph.D. in Mathematics from the IIT Kanpur, India in 2002. After her doctoral degree she was a Post Doctoral Research Fellow at the Department of Mathematics, University of Trento, Italy from 2002-2004, and Institute of Information and Mathematical Sciences, Massey University, Auckland, New Zealand from 2004-2006. Currently she is actively involved in many research problems, and specializes in the areas of Mathematical modelling of epidemiological/ecological systems.

Abstract of the Talk

The proposed talk will briefly introduce the mathematical modeling of infectious diseases, present the important and critical issues in modeling and analysis, report some of our recent research results in the area of mathematical modeling of COVID-19, and finally will focus on the emerging and current trends in modeling the transmission dynamics of COVID-19 in the world.

Prof. Sandip Banerjee

Department of Mathematics
IIT Roorke

Invited Talk

Title of Talk - Effect of productivity and seasonal variation on phytoplankton intermittency on a microscale an ecological study using closure approach

Date - 21-07-2023 | **Time -** 3:00 pm – 3:30 pm

Brief Bio

Sandip Banerjee is a Professor in the Department of Mathematics at the Indian Institute of Technology Roorkee. He holds a Ph.D. in Applied Mathematics from the University of Calcutta and has a Post Doctoral Fellowship from the University of Helsinki. With extensive teaching and research experience, he has published 44 international and 6 national papers, authored 4 international and 3 national books, and received accolades such as the Indo-US Technology Forum Medal and Indo-US Fellowship. He has organized workshops, conferences, and seminars, contributed to course development, conducted sponsored projects, guided 7 Ph.D. students, and delivered invited talks internationally.

Abstract of the Talk

A microscale ecological study using the closure approach to understand the impact of productivity controlled by geographical and seasonal variations on the intermittency of phytoplankton is done in this talk. Using this approach for a nutrient–phytoplankton model with Holling type III functional response, it has been shown how the dynamics of the system can be affected by the environmental fluctuations triggered by the impact of light, temperature, and salinity, which fluctuate with regional and seasonal variations. Reynold's averaging method in space, which results in expressing the original components in terms of their mean (average value) and perturbation (fluctuation) has been used to determine the impact of growth fluctuation in phytoplankton distribution and in the intermittency of phytoplankton spreading (variance). Parameters are estimated from the nature of productivity and spread of phytoplankton density during field observation done at four different locations of Tokyo Bay. The model validation shows that our results are in good agreement with the field observation and succeeded in explaining the intermittent phytoplankton distribution at different locations of Tokyo Bay, Japan, and its neighboring coastal regions.

Dr. Mohit Kumar Jolly

Centre for BioSystems Science and Engineering (BSSE)
IISc Bangalore

Invited Talk

Title of Talk - Mathematical modeling to understand cancer cell adaptation during metastasis and therapy resistance

Date - 22-07-2023 **| Time -** 9:20 am – 10:00 am

Brief Bio

Mohit completed his B Tech and M Tech from IIT Kanpur in Biological Sciences and Bioengineering in 2010 and 2012 respectively, and earned his PhD in Bioengineering from Rice University in 2016. He joined IISc Bangalore as an Assistant Professor in 2018, where he leads the Cancer Systems Biology Laboratory. His research is focused on developing mechanism-based mathematical models to decode cancer cell adaptation during metastasis and drug resistance, while working in close collaboration with experimental and clinical collaborators. He served as the co-chair of Mathematical Oncology subgroup (250+ members worldwide) at the Society for Mathematical Oncology (2020-22) and is now the Editor-in-Chief of NPJ Systems Biology and Applications.

Abstract of the Talk

Cancer metastasis – the spread of cancer cells from one organ to another – and therapy resistance remain two unsolved clinical challenges, and claim over 90% of all cancer-related deaths. A hallmark of these dynamical processes is the ability of cancer cells to reversibly adapt their behavior in response to varying environmental conditions, called as phenotypic plasticity. This talk will discuss how mathematical models, in close integration with experimental and clinical data, can be used to better understand the dynamics of phenotypic plasticity, and suggest novel therapeutic interventions to possibly overcome these clinical challenges

Dr. Dharmendra Tripathi

Department of Mathematics and Statistics
NIT Uttarakhand

Invited Talk

Title of Talk - Bioinspired Membrane Based Pumping Mechanism for micro level Transport Phenomena

Date - 22-07-2023 **| Time -** 10:00 am – 10:30 am

Brief Bio

Dr. Dharmendra Tripathi, an Associate Professor at NIT Uttarakhand, is an accomplished researcher in applied mathematics. He has an extensive academic background and has held faculty positions at esteemed institutions. His research encompasses mathematical modeling and simulation of biological flows, peristaltic flow, infectious diseases dynamics, microfluidics, CFD, biomechanics, heat transfer, nanofluids, energy systems, and numerical methods. He has made significant contributions to the field with over 200 papers, authored books, and numerous conference presentations. Dr. Tripathi has received prestigious awards, fellowships, and recognition for his outstanding contributions.

Abstract of the Talk

This talk explores the bioinspired membrane pumping mechanism found in physiological systems like the circulatory, respiratory, and urinary systems. It emphasizes the importance of designing smart micro pumping devices for diagnostic purposes and sample/chemical mixing at specific temperatures. Mathematical models for the Bioinspired Membrane Based Pumping Mechanism in microscale transport phenomena will be discussed. The talk includes an analysis of the governing equations for mass, momentum, and energy conservation, focusing on heat transfer and flow. It explores how this pumping mechanism drives both Newtonian and non-Newtonian fluids through microchannel, regulating fluid flow and heat transfer. The talk also addresses the influence of membrane and physical parameters on flow and thermal characteristics, providing recommendations for emerging technologies in transport phenomena.

Mr. Satya Sai Mudigonda

DMACS -SSSIHL

Invited Talk

Title of Talk - The Science of Aging: Actuarial Perspectives on Longevity & Health

Date - 22-07-2023 **| Time -** 11:00 am - 11:30 am

Brief Bio

Mr. Sathya Sai has 32 years of senior management experience in Actuarial and Technology, working in 9 countries across the globe. They have successfully completed 36 large international projects worth 25 million USD with teams of up to 500 members. Sathya Sai holds five professional qualifications in actuarial science, insurance, and management and has published 36 research papers in international journals. They have also authored 7 articles in actuarial magazines and presented at conferences. With 27 dissertations guided and co-guided at the postgraduate level, 12 years of teaching experience, and mentoring 3 scholars to receive their PhDs, Sathya Sai's contributions have been recognized with three organization-level awards, including the CAS University Award 2022.

Abstract of the Talk

This abstract examines how actuarial science is applied to the study of aging. It focuses on the use of mathematical models to predict lifespan, health outcomes, and factors that influence the aging process. Actuaries, with their expertise in assessing risk and uncertainty, play a significant role by quantifying the probability of health events and providing insights for decision-making regarding aging and longevity. The abstract discusses important concepts such as mortality tables, survival curves, and life expectancy calculations, which are used to evaluate lifestyle choices, genetic factors, and environmental influences on aging. Actuarial models also assess interventions aimed at promoting healthy aging. The interdisciplinary collaboration among actuarial scientists, biologists, and epidemiologists enriches our understanding of aging, leading to evidence-based decision-making for improved health and longer lives.