Patrika

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59th Annual Meeting

At the invitation of the Indian Institute of Petroleum, Dehra Dun, the 59th Annual Meeting will be held at Dehra Dun, from 6 to 9 November 1993.

The scientific programme will consist of one symposium on "Natural Disaster Mitigation" and lecture presentations by new Fellows and Associates. Apart from these four special lectures are being arranged.

In the symposium on "Natural Disaster Mitigation" the speakers are – K G Ranga Raju on 'River control for disaster mitigation and management', D A Mooley on the 'Origin, incidence and impact of droughts over India and remedial measures for their mitigation', P V Joseph on 'Tropical cyclone hazards and the warning and disaster mitigation systems in India', P K Das on 'The mitigation of hazards posed by storm surges' and by K N Khattri on 'Mitigation of earthquake hazards'.

The four special lectures are by K S Valdiya on 'Dynamic Himalaya: Continuing movements and uplift', Santimay Chatterjee on 'Meghnad Saha and Satyen Bose – Champions for a common cause', A P J Abdul Kalam on 'Technology development in India: Some experiences' and G Padmanaban on 'Molecular biology and public health'.

The following is the list of lectures by Fellows and Associates.

P Chaddah, CAT, Indore, "Irreversible magnetization of superconductors"

Gautam Mandal, TIFR, Bombay, "Phase transitions in cellular automata"

C R Subrahmanya, National Centre for Radio Astrophysics, Pune, "Probing the universe with radio surveys"

G P Pandey, NCL, Pune, "Harvesting light energy in chemical synthesis"

D D Sarma, IISc., Bangalore, "Novel electronic structures in selected transition metal oxides"

S K Bhatia, IIT, Bombay, "Adsorption and transport in microporous solids"

V R Choudhary, NCL, Pune, "Coupling of exothermic and endothermic reactions in methane/natural gas conversion"

Placid Rodriguez, IGCAR, Kalpakkam, "New toughness parameters from tension tests based on micromechanism of ductile fracture"

Ramesh Chander, University of Roorkee, Roorkee, "Role of differential uplift of mountains in the occurrence of earthquakes of the Himalaya"

Sarva Jit Singh, Maharshi Dayanand University, Rohtak, "Deformation of a stratified medium by surface loads"

Asha Mathur, K G Medical College, Lucknow, "Role of Japanese encephalitis virus-induced chemotactic factor in the pathogenesis of disease"

R K Banerjee, IICB, Calcutta, "Reactive oxygen metabolites in the generation of stress-induced gastric ulceration — role of gastric peroxidase"

H S Savithri, IISc., Bangalore, "Portrait of a small spherical plant tymovirus"

N C Mandal, Bose Institute, Calcutta, "Regulation of expression of galactose catabolizing enzymes in *M. smegmatis*"

A J Rao, IISc., Bangalore, "Use of human placenta — a discarded tissue as a model to understand the process of differentiation"

Associates–1993

U S Agarwal, National Chemical Laboratory, Pune — Chemical Engineering

Alok Kumar, Institute of Physics, Bhubaneswar — String Theory

A J Basu, National Aerospace Laboratories, Bangalore — Computational Fluid Dynamics

D Choudhary, Tata Institute of Fundamental Research, Bombay — Theoretical High Energy Physics

P P Das, Indian Institute of Technology, Kharagpur — Computer Engineering

Asha K Kinger, All India Institute of Medical Sciences, New Delhi — Biotechnology

R S Mishra, Defence Metallurgical Research Laboratory, Hyderabad — High Temperature Material Behaviour

A S Raghubanshi, Indira Gandhi National Open University Regional Centre, Patna — Tropical Ecology

N A Shah, Tata Institute of Fundamental Research, Bombay — Ergodic Theory

R Sujatha, Tata Institute of Fundamental Research, Bombay — Algebra

R R Viswanathan, Centre for Artificial Intelligence and Robotics, Bangalore — Neural Networks

Mid-Year Meeting

The fourth Mid-Year Meeting of the Academy, now a regular annual feature, was held at the Indian Institute of Science, Bangalore on 23 and 24 July 1993. There were sixteen lecture presentations by new Fellows and Associates after a brief introductory remark by the President, Prof. R Narasimha. The first morning session on 23rd July was held under the chairmanship of Prof. N Mukunda. R Ramaswamy, Jawaharlal Nehru University, New Delhi was the first speaker, on "Experimental quantum chaos". The quantum mechanics of a particle in a 2-dimensional billiard can be studied using microwave cavities. The results of some analog experiments designed to test current theories of chaotic behaviour in quantum systems were presented. Gautam R Desiraju, University of Hyderabad, Hyderabad next spoke on "C–H . . . O hydrogen bonds and molecular recognition". The long range, electrostatic character of the C–H . . . O bond determines its role in molecular recognition. Such recognition depends on multiple matching of functionalities among molecular components so as to optimize a number of intermolecular interactions which may be of different strengths and directionalities. He was followed by A K Raychaudhuri, Indian Institute of Science, Bangalore who spoke on "Certain recurring themes of metal-insulator transition as seen at low temperatures".

The first talk in the next session, chaired by Dr B L Deekshatulu, was on "Gravity without metric" by Abhijit K Kshirsagar, Raman Research Institute, Bangalore. He described a recent development in gravity theories. He showed that a complete description of gravity is possible without explicit reference to metric. The next talk was by S P Bhattacharyya, Indian Association for the Cultivation of Science, Calcutta on "On the analysis of reaction paths — A local versus global approach". The last speaker in the morning session was A V Krishna Murty, Indian Institute of Science, Bangalore who spoke on "Theoretical modelling of structural components".

In the first afternoon session, chaired by Prof. G Mehta, the first talk was by Anil K Lala, Indian Institute of Technology, Bombay on "From membranes to molecular devices". The next talk was by K N Ganesh, National Chemical Laboratory, Pune on "Chemically modified nucleic acids: Synthesis and applications".

The first talk in the second afternoon session, chaired by Prof. M K Chandrashekaran, was by S K Saidapur, Karnatak University, Dharwad on "Evolution of reproductive patterns among Indian Anura". He was followed by K Dharmalingam, Madurai Kamaraj University, Madurai who spoke on "The fragile genome". The next talk was on "New vaccines — Problems and perspectives" by K V S Rao, International Centre for Genetic Engineering and Biotechnology, New Delhi.

In the morning session on Saturday 24 July, under the chairmanship of Dr V K Gaur, there were five talks. The first was on "Perturbation of matrix spectra" by R Bhatia, Indian Statistical Institute, New Delhi. The second talk was on "Role of physical processes on the simulation and prediction of Asian summer monsoon" by U C Mohanty, National Centre for Medium Range Weather Forecasting, New Delhi. He was followed by R K Shyamasundar, Tata Institute of

Fundamental Research, Bombay who spoke on "Challenges in the design of real-time reactive systems". A Nangia, University of Hyderabad, Hyderabad next spoke on "Synthesis of iridoid lactones". The last talk of the meeting was by P K Saxena, Jawaharlal Nehru University, New Delhi on "Cytokines in cellular communications". He spoke of the work done in JNU on the identification, purification and characterization of some novel cytokines.

The Evening Lecture by Prof. U R Anantha Murthy, Sahitya Akademi, New Delhi on "The search for identity in an Indian writer: A personal view" on Friday 23 July, was one of the highlights of the 1993 Mid-Year Meeting.

Spectral and Inverse Spectral Theory

A workshop on Spectral and Inverse Spectral Theory was organized by the Academy at the Kodaikanal Observatory during 24 to 30 August 1993, with generous assistance from Matscience, Madras and the Indian Institute of Astrophysics, Bangalore.

The main lectures were by P Hislop, University of Kentucky, USA on 'Spectral properties of a hyperbolic manifold', K B Sinha, ISI, Delhi on 'Krein's spectral shift function and its applications', A Jensen, Mittag-Leffler Institute, Stockholm on 'Scattering theory of Stark hamiltonian', H Isozaki, Osaka University, Japan on 'N-body Schrodinger operators', S Nakamura, University of Tokyo, Japan on 'L^p-estimates for Schrodinger operators' and M Krishna, Matscience, Madras on 'Inverse spectral theory for Jacobi matrices'.

While Hislop described how an eigenfunction expansion for the continuous part of the Laplace-Beltrami operator on the manifold leads to a natural meromorphic continuation of the classical Eisenstein series, Sinha dealt on the remarkable properties of Krein's shift function and its relation with the index for a pair of projections. Jensen's talk developed an abstract time-dependent theory of scattering and applied it to Stark case, Isozaki showed how Mourre's commutator method can be adapted to obtain the absorption principle and radiation limiting condition for N-body Schrodinger operator. Nakamura used a new kind of functional calculus to obtain L^p-estimates for the Schrodinger group and Krishna described how a given band structure of the spectrum leads to an almost periodic potential for a discretized random Schrodinger operator. There were also some shorter talks, notably by P L Muthuramalingam, ISI, Bangalore on 'A conjecture for some partial differential operators on L^2 ($\hat{R}$)'.

There were altogether fourteen participating scientists, the salubrious and peaceful atmosphere of the observatory aiding many lively discussions.

Special Issue of Journal

Sādhanā – Academy Proceedings in Engineering Sciences, Vol. 18, Part 2, June 1993, pages 143–364, "Trends in Computer Vision"

Computer vision is the task of making computers understand what is happening in the environment they "see". This has been a fascinating subject of research for many decades. Behavioural vision, active vision, machine vision and stereo vision are some examples. David Marr defined 'vision' as achieving a particular visual task and this task-oriented, computational approach has been the basis of machine vision. Research on human vision has revealed that 'understanding the environment' is extremely, complex, as such, one is yet to exploit it in the realm of computer vision.

Whereas computer technology has progressed rapidly from programs written in procedural languages like Assembler, Fortran, Cobol, C to object-oriented languages like C++, Prolog, Lisp, Sybase, Ingress, etc., from von Neumann's sequential machine to parallel processing work stations to supercomputers, from stand-alone nodes to client-server architectures, the progress on computer vision has been rather slow. We are yet to realize a good 'edge detector' or a good 'segmentation' algorithm, despite the best efforts from dedicated researchers over the decades.

However, computer vision is being increasingly applied successfully in a wide variety of areas. The recent advances in hardware are being exploited to incorporate reasoning between different vision levels. Artificial neural networks are being increasingly used to emulate the human visual system for handling a wide variety of vexing image

processing problems associated with rotation, scaling, occlusion and restoration. The role of genetic algorithms in vision is still not clear, but these appear to have some potential in the near future. Amongst the other recent trends in vision, the most notable is the incorporation of gaze (eye movements) and vergence control (the process of adjusting angle between cameras).

In this special issue, a set of twelve papers have been chosen, broadly representing the current research areas in the Indian context. The paper by Ram Chellappa and Rosenfeld addresses the current issues in computer vision by noting that, in general, vision problems are ill-defined, ill-posed and computationally intractable. Das and Chatterji present a survey of distances in the geometry of digitized spaces of arbitrary dimensions and related issues in digital picture processing. Chattopadhyay and Das develop a unified approach to quantize and reconstruct curves with two parameters that is useful in solving the domain-finding problems as well. Venkatesh *et al* use Hermite polynomials for decomposing images into a multilayered representation of image called 'wavelet arrays' and also give a procedure to extract zero crossings at different scales. Shankar Pal and Lui Wang address the problem of image representation and retrieval for shape analysis and template matching, uncertainty management in recognition and creating new images of various poses by improving the compact representation of fuzzy medial axis transformation (FMAT). Arun K Pujari presents an active vision volume intersection-based approach to recover shape from 2-D images. R Krishnan and Kiron K Rao use time series techniques for shape recognition.

Ashfaq Khokar and Viktor Prasanna present parallel implementation of stereo matching and image matching with linear features as matching primitives. Sengupta and Sahasrabudhe address the problem of reducing the sparsity of depth points by orienting the epipolar line of the cameras in a direction that maximizes the number of feature points. Subhodev Das and Narendra Ahuja address the problem of surface reconstruction for stereo images for scenes with large depths using a four-step process. Arun Agarwal describes the organization, interaction of different modules of document image processing along with algorithms to extract higher level representations from visual sketches, physical and logical layouts and block primitives.

A list of recent references is included to serve as a ready reckoner for the 'state of art' in this line.

Obituary

Ajay Shrinivas Divatia was born in 1927 at Sukkur in the erstwhile Sind province. He had his early education in Bombay, graduating in 1947 from the University of Bombay. After getting his Ph.D. from the University of Wisconsin Madison, he joined the then Atomic Energy Establishment, Trombay in 1956 and started making the components of an accelerator. The getter ion pump and sputter ion pump were successfully developed under his guidance.

He was entrusted with the responsibility of installing and commissioning the 5.5 MeV Van de Graff accelerator at Trombay in the early sixties. With the commissioning of the Van de Graff accelerator in 1962, he started a research and development programme using charged particle beams. In 1973 he was called upon to shoulder the responsibilility of building the 88-inch Variable Energy Cyclotron at Calcutta. He successfully completed the project in 1977 despite innumerable difficulties. The construction of the cyclotron under his leadership not only demonstrated the capabilities of the Indian scientists and engineers but also contributed significantly to the development of many technologies. He also organized various R&D programmes, using the cyclotron. His contributions in various programmes such as transfer reactions, involving single and two nucleon transfers, reaction spectrum measurements from (α, *xn*) reactions, nuclear reactions using polarized proton beams, (*d,d*) elastic scattering experiments, etc. are significant. He was also primarily responsible for the helium recovery project from hot springs at Bakreswar near Shantiniketan.

He was elected a Fellow of the Academy in 1975. He passed away at Ahmedabad in January 1993, leaving many friends and colleagues to mourn his loss.

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