

need not be rigid, but are actually quasi rigid. They seem to emphasize this point for the first time since other methodologies currently available in the literature, particularly for the characterization of non-regular forms of nucleic acid structures, seem to lay less importance on this aspect. It is thus possible to expect that characterization can be different depending on which unit is used, for example phosphate group alone or sugar group alone or even in combination etc. Bases suffer from quasi-rigidity, they point out, and hence require special care in the current methodology. This flexibility in the choice of unit enables, for instance, to look at results (in the case of nucleic acids) for double strand (DS-mode), and single strand (SS-mode) superpositions as well leading to possibly interesting variations.

By way of contrast a few remarks may be presented here relating to proteins which are valid *mutatis mutandis* to other biopolymers as well. The ϕ , ψ are body-fixed internal parameters. The Φ , methodology depends, however, on the choice of appropriate rigid fraction and then extracting a single angle Φ , through the rotation about an axis in space and not body-based. But the relation is firmly established and leads to, in the case of proteins, for example, a reduction from two to one angle parameter relating one unit to the next. The normal ϕ , ψ information content is now loaded into a single bond Φ . As may be expected Φ , now has its own allowed

and disallowed regions for biomolecular structures. A further study of this, as pointed out by them, is likely to lead to simplified approach to knowledge based-model building and prediction algorithms. Since any dipeptide now needs only one angle Φ , to characterize the relative orientation, a full data bank build-up on all possible (400) amino acid-amino acid interactions from protein data banks would act as the core of the required knowledge base. Extensive use of the model is likely to prove its worth in future, not merely in characterization but as an effective tool in analysis of fine structures of biopolymers as deduced from single crystal X-ray data.

It is learnt from the authors that those who wish to have a copy of the computer program may write to Prof. R. Srinivasan, Department of Crystallography and Biophysics, University of Madras, Madras.

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A report on National Seminar on Recent Developments in Mathematics*

Contemporary mathematics plays a dominant role in popularizing science, engineering and many topics in social sciences. Recognizing its importance, a three-day National Seminar on Recent Developments in Mathematics was organized at the Department of Mathe-

matics, Karnatak University, Dharwad from 16 to 18 December 1993.

The technical sessions covered important topics: physiological fluid dynamics (two sessions), general analysis of nature of solution of differential equations (three sessions), Ramanujan's contributions to the theory of elliptic functions, Lie algebra and Lie groups and its applications, Hadamard matrices, global domination, etc. in graph theory, univalent functions, Hall's conjecture on starlike functions, and non-

continuous transformations (six sessions).

In a keynote address, T. J. Pedley (Leeds, UK) summarized the mathematical modelling of blood flow, breathing and bioconvection.

Bahulyan (NIO, Goa) presented the applications of fluid dynamics principles in three-dimensional circulation in ocean. P. C. Sinha (IIT, Delhi) presented the models in operation to study coastal oceanography. P. S. Kulkarni (IISc, Bangalore) gave a

*The seminar, held on 16-18 December 1993, was sponsored by the Karnatak University, Dharwad, and the Department of Science and Technology, New Delhi

highly motivated picture of CFD (computational fluid dynamics) and its role in long range missiles like Agni, Prithvi, etc.

P. L. Sachdev (IISc, Bangalore) presented the connection problems for Euler-Painleve transcendents. He gave a comprehensive analytical-numerical treatment of ODE arising from GBE with general nonlinearity and variable viscosity. D. Y. Kasture (Aurangabad University) talked on differential inequalities and their applications in mechanics. V. Raghavendra (IIT, Kanpur) talked about the new method in the analysis of elliptic b.v.p. for exterior domain. P. S. Datti (TIFR Centre, Bangalore) explained the global existence of classical solutions to non-linear wave equations.

D. S. Chandrashekharaiiah (Bangalore University) reviewed his work on complete solutions for a coupled system of partial differential equations arising in elastodynamics, thermoelasticity and poroelasticity. Vasudevamurthy (TIFR Centre, Bangalore) gave a detailed picture of power boundedness of matrices and his work. M. Venkatachalappa (Bangalore University) talked about the stability of stratified conducting shear flows. Palaniyappan (IISc, Bangalore) presented his work on Stokes flow images in a no slip plain wall. P. S.

Hiremath (Gulbarga University) analysed the fluid flow in corrugated pipe. M. S. Malshetty (Gulbarga University) talked about convective instabilities in a horizontal porous layers and their applications in chemical engineering. N. M. Bujurke (Karnatak University, Dharwad) explained the role of computer-extended series solutions of ODE and PDE (linear and nonlinear) in unveiling the analytical structure of unknown functions and the ideas leading to analytic continuation.

S. Bhargava (Mysore University) presented a glimpse of Ramanujan's contributions to the theory of elliptic functions as well as to Jacoba's and Weierstrass's theorems. S. K. Sen (IISc, Bangalore) explained the significance of linear algebra and its scope in various fields. B. S. Kiranagi (Mysore University) talked about Lie algebra and Lie group bundles. Vanaja (Bombay) lectured on extended modules. C. Puttamadaiah (Mysore University) highlighted orthogonalities in normed linear spaces. R. Balakrishnan (Anna-malai University) presented some known as well as new results and some challenging problems in Hadamard matrices. He also discussed the integral equivalence and Hadamard equivalence of Hadamard matrices. E. Sampathkumar (Mysore University) surveyed the

concepts and results associated with global dominations, set dominations, global set dominations and point set dominations. Walikar (KUPG Centre, Belgaum) presented his work on winding number of graph. K. S. Amur (Karnatak University) presented a talk on minimal surfaces and reviewed the nature of open problems listed by Osserman. R. Parvathamma (Ramanujan Institute, Madras) gave a brief account of the neighbourhood of univalent functions. S. Ponnuswamy (SPIC Science Foundation, Madras) talked on Hall's conjecture on starlike mappings and its proof and posed several problems. S. R. Malghan (Karnatak University) lectured on non-continuous transformations and elaborated the concepts like connected mappings, almost continuous maps and functions with closed graphs.

Besides invited talks, there were presentations of papers on various topics which included complex analysis, graph theory, algebra, topology, fuzzy analysis, fluid dynamics, numerical methods and number theory.

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COMMENTARY

Crisis in undergraduate medical education in India

Om Prakash

It is a matter of great concern that we are facing today in the education scene in our country. In this paper, I would like to portray some of the aspects that have impressed me as important with respect to undergraduate education in India.

First of all, is there a crisis? I do believe that there is a situation that is bordering on a crisis. Over the past few decades, we seem to be moving in a direction in terms of medical education that is far from 'healthy'. We are, no doubt turning out a large number of doctors, but it appears that a large

majority of them are somehow alienated and insulated from the stark realities of health care delivery. The persistent and increasing lack of equitable health care distribution to the masses at large is not causing any impact on the younger generation. It is not perhaps the fault of the younger generation alone; the planners of medical education in our country have to bear a large proportion of the responsibility for the errors of judgement which has, over the years led to the present state of affairs.

Are we recognizing that there is a crisis? One supposes that we are, to

some extent, doing so. Several committees and conferences have addressed themselves to this very problem, but while they have succeeded in producing documents and recommendations, there has been little in the way of implementing these suggestions in innovative means to modify medical education. In other words, while we realize that there is a need for substantial change in the very ethos of medical education, there are few attempts to make any meaningful changes.

What are the implications of these trends? The implications are clear.