PROCEEDINGS
OF THE
NINETY EIGHTH SESSION OF THE

INDIAN SCIENCE CONGRESS

CHENNAI, 2011

PART II

SECTION OF MATHEMATICAL SCIENCES (including STATISTICS)

President : **Prof. Satya Deo**

CONTENTS

98th Indian Science Congress

January 3-7, 2011, Chennai

I

PRESIDENTIAL ADDRESS

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Prof. Satya Deo

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ON SOME LANDMARK EXAMPLES IN COHOMOLOGICAL DIMENSION THEORY

President : **Satya Deo***

SECTION OF MATHEMATICAL SCIENCES
(including STATISTICS)

1. Introduction

All invited speakers, fellow mathematicians, ladies and gentlemen!

First of all I would like to thank the members of the Indian Science Congress for electing me as President of the Section of Mathematical Sciences (including Statistics) of the Indian Science Congress Association for the year 2010-11. I feel highly honoured by my election and wish to say that I have tried to do my work to the best of my abilities, and to have a good academic session of this Section. I am happy that we are meeting at one of the best private universities of India situated in Chennai.

Dimension theory is a classical branch of topology initiated by people like H. Lebesgue, K.Menger, P.Urisohn, E. Čech and a host of other mathematicians. One of the Indian Mathematicians, Prabir Roy, has also contributed an important piece of work in this area.

In this talk, however, I will discuss, very briefly, a few fundamental examples in the cohomological dimension theory due to A.N.Dranishnikov and others, which led to the solution of some most outstanding and difficult problems of topology. Some of the problems were apparently not related to the theory of cohomological dimension at all, but the actual connections were observed and precisely described by Bob Edwards, a man whose area of interest was geometric topology. The basic tools required in the construction of these examples are generalized cohomology theories whereas the connections between geometric topology and the cohomological dimension were discovered using subtle constructions of homotopy theory initially by Bob Edwards and later by John Walsh and Dranishnikov.

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We remark that a cohomology theory in the sense of Eilenberg-Steenrod is already quite an abstract and general theory, but by relaxing one axiom out of the seven Eilenberg-Steenrod axioms in the definition of a cohology theory gives the impression that the resulting "generalized cohomology theory" must be rather too abstract and consequently of no practical applications. Surprisingly, however, we get some beautiful examples of such a generalized cohomology theory which have given rise to entirely new areas of topology in their own right. Cobordism theory and particular cases of K-theories are the most attractive examples of such a generalized cohomology theory. We begin with very basic definitions of dimension theory and then go directly to describe the fundamental landmark examples which have provided solutions to the most challenging problems in topology. Then we describe their connections with geometric topology and show how they have also provided the solutions of problems of geometric topology.

Discovering results in cohomological dimension theory parallel to the classical covering dimension theory is always a natural question which is usually straightforward, but occasionally it presents a formidable challenge. The most important amongst such challenges is what is known as the **Alexan-droff's problem**. We have focussed mainly on some major challenges of this type making the dimension theory in the sense of Legesgue and the cohomological dimension theory initiated by P.S. Alexandroff very distinct from each other. We try to indicate the latest results in the cohomological dimension theory.

2. Basic definitions

Definition 2.1. *Given a topological space X,* $\dim(X)$ *is the least integer n such that every finite open cover U of X has a refinement V such that intersection of every n + 2 members of V is empty.*

- ≤ $\dim(X)$ defined above is called the Lebesgue's covering dimension of the space X. This was indirectly proposed in 1911, but the above precise definition is due to Čech given much later. It is clearly a nonnegative integer which is a topological invariant of the topological space X. The concept agrees with our intution in the sense that $\dim(R)=1$, $\dim(R^2)=2$, …, $\dim(R^n)=n$.
- ≤ There are several characterizations of the above covering dimension.
- ≤ One such characterization is the following result proved by Alexan-droff.

Theorem 2.1. *Let X be a normal space. Then* $\dim(X) \xi n$ *if and only if for any closed subspace A of X, any continuous map f* : $A \leq Sn$ *can be extended to a continuous map F :* $X \leq S^n$ *If there*

is no such n, then we say that $\dim(X) = \zeta$.

⩽ Homology and cohomology was introduced in the dimension theory by P. S. Alexandroff around 1930's who made the following definition.

Definition 2.2. *Let G be an abelian group and X be any topological space. The cohomological dimension of X, with coefficients in the group G, denoted by dimG(X), is the least integer n such that for all* $q \xi n + 1$ *and all closed subspaces A of X,* $H^q(X, A;G) = 0$.

⩽ Here we use Čech cohomology. Let $K(G; n)$ denote the Eilenberg-Maclane CW-complex. Since there is a canonical isomorphism $H^q(K(G, n)) \equiv [X, K(G, n)]$, we have the following important criterion in terms of extension of maps for the cohomological dimension of a metric space X.

Definition 2.3. *Let X be a metric space and G an abelian group. Then* $\dim G(X)$ *is the least integer n such that any continuous map* $f : A \leqslant K(G, n)$, *where A is a closed subset of X, has a continuous extension* $F : X \leqslant K(G, n)$. *If there is no such integer, we say that* $\dim_Z(X) = \zeta$.

⩽ Since $K(Z, 1) = S1$, we conclude that $\dim(X) \xi$ if and only if $\dim_Z(X) \xi 1$. However, for $n > 1$, Alexandroff proved in 1932 using the Hopf's Extension Theorem, that $\dim_Z(X) \xi \dim(X)$ and if the latter is finite, then equality holds. At the same time, he asked the following.

Problem : Does there exist a compact metric space X such that $\dim(X) = \zeta$, but $\dim_Z(X) < \zeta$.

There is yet another way of defining the concept of cohomological dimension due to H. Cartan (1949-50) using sheaf cohomology. Let X be a topological space and I be a paracompactifying family of supports on X. The family of all closed sets on a paracompact space X and the family of all compact subsets of a locally compact space X are the best examples of such paracompactifying families of supports. Let L be a PID ($L = Z$ is the most important case) and A be a sheaf of L modules over X.

Definition 2.4. *The largest integer n such that* $H_I^q(X, A) = 0 \forall q > n$ *and for all sheaves A on X, if it exists, is called the cohomological dimension of X over the PID L. We denote it by* $dim_L(X) = n$. *If there is no such n then we say that the cohomological dimension of X is infinite.*

It can be shown that dimension of X over L is independent of the family of supports I provided the Extent of $I = X$ (see [2]). When G is an abelian group, we regard G as a Z-module and in that case $dim_G(X) = dim_Z(X, G)$ where G is regarded as the constant sheaf of Z-modules

over X. This interpretation of $dimG(X)$ is very important in the cohomological theory of transformation groups (see [3], Chapter VII) Generalizing this notion of cohomological dimension G.E.Bredon defined (see[2]) the concept of bf large cohomological dimension of a space X over a PID L as follows:

Definition 2.5. *The integer n, if it exists, such that* $n = sup_I \{dim_{I,L}(X)\}$ *is called the large cohomological dimension of X over L and is denoted by* $Dim_L(X)$*; if such an integer does not exist, then we say that* $Dim_L(X) = \zeta$.

Bredon also proved

Theorem 2.2. *If X is an n-manifold then* $Dim_Z(X) = n$ *or* $n + 1$.

Bredon left open the question whether or not the dimension of an n-manifold is n or n+1.

I answered the above question of Bredon as follows :

Theorem 2.3. *(Satya Deo* [6] *The large cohomological dimension of the real line R is two. Afterwards, I also answered the general question of Bredon as follows :*

Theorem 2.4. *Satya Deo [7] The large cohomological dimension of an n-manifold is n+1.*

The above two results of mine show that the concept of the large coho-mological dimension does not exactly match with the geometric intuition of the idea of a dimension function. In spite of this, the concept has its own applications in cohomology theory of transformation groups.

3. The examples

≼ While the study of cohomological dimension progressed rather rapidly from that point onwards, the above problem of Alexandroff remained unsolved for more than 50 years. In the year 1987, A.N. Dranishnikov, using the ideas of Bob Edwards (These were published in Notices of AMS, in 1978), gave the following interesting example, solving the Alexandroff's problem.

Example 3.1. *[Dranishnikov, 1987] There exists a compact metric space X such that* $dim(X) = \zeta$, *but* $dim_Z(X) = 3$.

The Example further sharpened

≪ Soon after the publication of above result, J.Dydak and J.Walsh improved Dranishnikov's result by proving the following best possible result- this was indeed a problem raised by Dranishnikov himself in his famous 1987 paper.

Example 3.2. *[Dydak and Walsh] There exists a compact metric space X such that* $\dim(X) = \zeta$, *but* $\dim_Z(X) = 2$.

One wonders what is the nature of the space X and how did Dranishnikov arrive at that example, and then how did J.Dydak and J.Walsh sharpened that example? Here are the main steps in brief :

Suppose that X is a compact metric space for which $dimX 6= dim_z X$. Then necessarily X has infinite covering dimension and infinite cohomological dimension, say $dim_z X = k_0$. Since $dimX = \zeta$, for each $n \xi k_0 + 1$, there are closed subsets $A \Upsilon X$ and maps $f : A \ll S^n$ that are essential as they do not extend to maps defined on all of X. Yet, every such map $f : A \ll S^n$ composed with the inclusion map of Sn into the Eilenberg-, MacLane space $K(Z, n)$ yields a map $f : A ! K(Z; n)$ that is essential, as every map $f : A \Upsilon K(Z, n)$ defined on a closed subset $A \Upsilon X$ is inessential, as it extends to map of a cone of A since $dimA \xi k_0$ implies that the cone of A had cohomological dimension at most $k_0 + 1$.

Recognising the coexistence of the phenomenon of there being a large class of essential maps to spheres and there being no essential maps to the Eilenberg-MacLane spaces $K(Z, n)$ as, suggested the need for an invariant which is sensitive to the maps into spheres, but is totally insensitive to maps into the Eilenberg-MacLane spaces at least for $n \ll k_0 + 1$. This invariant was indeed identified by Dranishnikov based on his analysis of an explicit construction introduced by Edwards, as mentioned in the introduction, and this led to the construction of his famous example.

≪ Analyzing the construction of Dranishnikov's example closely, we observe that the space X for which $\dim(X) = \zeta$ and $\dim_Z(X) = 3$ must have the following properties :

(a) For each $n > 3$, there exists a closed subset A in X and a continuous map $f : A \ll S^n$ which cannot be extended to X.

(b) For each $n > 3$, every continuous map $f : A \ll K(Z, n)$ from any closed subset A in X, has a continuous extension $X \ll K(Z, n)$.

⩽ Note that $S^n \curlyvee K(Z, n)$ and therefore the maps $f : A \leqslant S^n$, which are essential become inessential when composed with the above inclusion maps. Detecting the coexistence of a large class of essential maps to spheres and no essential maps to $K(Z, n)$'s suggested the need for an invariant that has some sensitivity for maps to spheres but is totally insensitive for maps to $K(Z, n)$'s at least for all $n \leqslant 4$.

⩽ As mentioned earlier, Dranishnikov identified the form of such an invariant based upon the work of Bob Edwards (1978). He found that such an invariant should be a "generalized cohomology theory" satisfying the coditions :

(i) $h^*(K(Z^r, k_0)) = 0$

(ii) $h^*(S^n) \leqslant= 0$ for some $n > k_0$

(iii) for each infinite complex C, $h^*(C)$ is a finite group.

⩽ He considered the complex K-theory of the Eilenberg-Maclane complexes with coefficients in Z_p, which was already worked out by Anderson-Hodgbin and Buchstaber-Mischenko in 1968. These results combined with the crucial constructions invented by Dranishnikov provided him the example of a compact metric space X such that $\dim(X) = \zeta$, but $\dim_Z(X) = 3$.

A familiar representation of $K(Z, 2)$ is the infinite complex projective space CP^ζ. Complex K-Theory, and apparently, other standard generalized cohomology theories do not vanish on CP^ζ. Consequently the invariant that sufficed for constructing the example of Dranishnikov was not available for constructing a compact metric space X with $dimX = \zeta$ and $dim_Z = 2$. But then, guided by the work of A. Zabrodsky [22], Dydak and Walsh identified a connection between cohomological dimension and the Sullivan conjecture, the latter a theorem due to H. Miller. In particular, an invariant was again identified that can be used to produce an example of a space X with $dimX = \zeta$ and $dim_X = 2$.

4. Borsuk's Problem

The first example of a compact metric space (compactum) X for which cohomological dimension is different for different coefficient groups G, was given by L.S.Pontyagin. He constructed a family of 2-dimensional compact $\{X_p\}_{p>1}$ such that $dimZ_p(X_p) = 1$, but $dim(X_p \times X_q) = 3$ where $(p, q) = 1$. This observation raised the following

Question : For any two compact metric spaces when can we say that $dim(X \times Y) = dimX + dimY$?

It follows from the Kunneth formula that for the coefficients in a field F, $dimF\,(X \times Y) = dim_F\,(X) + dim_F\,(Y))$. After sometimes it became clear that some sort of local conditions on the compacta X and Y are necessary in order that the dimension of the product is equal to the sum of the dimensions, i.e., the logarthmic law for dimension holds. K. Borsuk made a partial success on this problem but finally raised the following

Problem Does the logarthmic law hods for the product of two ANR (absolute neighbourhood retract)compact metric spaces?

It is a consequence of the work of Dranishnikov that the Borsuk's problem was solved negatively as follows :

Example 4.1. *There is a family of 4-dimensional AR compacta* $\{X_p\}$ *indexed by prime numbers such that* $dim(X_p \times X_q) = 7$, $p \not\leqslant q$.

5. Cell-like mapping problem

⩽ The solution of the Alexandroff's problem resolved several other pending problems in different branches of topology, which had been shown to be equivalent to the Alexandroff's problem.

⩽ As an example, the question of a cell-like map from a compact metric space to another compact metric space (or CE-problem) raising the dimension was open for quite some time. It was proved by Bob Edwards that there will exist cell-like mapping raising the dimension if and only if there exists a compact infinite dimensional metric space having finite cohomological dimension. Therefore it now follows from Dranishnikov's result that a cell-like map between two compact metric spaces can raise the dimension. It can be proved using the result of Alexandroff that if the dimension is raised, it will be raised to infinity- it cannot be raised by a finite amount.

6. Infinite dimensional manifolds having finite cohomology dimension

⩽ Similarly, the question whether or not there exist cohomology n-manifolds which are in¯nite dimensional in the sense of covering dimension, also got resolved in affirmative. Recall that a paracompact Hausdorff space which is cohomologically locally connected, has local n-homology as Z, and whose n-demensional homology is isomorphic to Z, is called a cohomology n-manifold. It is a classical result that n-dimensional

cohomology manifolds are honest manifolds for n=1,2,3. In view of the results of Dydak and Walsh, it now follows that one can have an infinite dimensional spaces which are cohomology man-ifolds for n=5,6,7 etc. However, the question about the existence of an infinite dimensional space which is a 4-dimensional cohomology manifold is still open.

7. Cohomological dimension of a space X and its Stone-Cech compactification EX

- Another new thing which was observed by Dranishnikov concerns the cohomological dimension of a space X and the cohomological dimension of its Stone- Čech compactification EX.
- Note that dim(X) = dim(EX) for any Tychonoff space X. Hence it is natural to ask, whether such a relation also exists for the cohomo-logical dimension.
- Much to the surprise of everyone, Dranishnikov gave the following interesting example :

Example 7.1. *[Dranishnikov, 1988] There exists a locally compact metric space X such that* $\dim_Z(X) = 4$ *but* $\dim_Z(EX) \leq 5$.

- We will sketch a proof of this unexpected result. Recall that the reduced complex K-theory of an arbitrary space X is defined to be the set of homotopy classes of maps [X, BU]. The reduced complex K-theory with coefficients in Z_p is defined as [$X \to B_p^2$, BU]. Here $\to$denote the smash product and B_p^2 is the Moore space $S_1 \cup_p B^2$ obtained by attaching B^2 to S^1 by a degree p map.

Proof : Let us consider the Eilenberg-Maclane space $K(S^4, Z)$. This is a CW-complex with ¯ltration

$$S^4 \subseteq K_1 \subseteq K_2 \subseteq \cdots$$

where each of the Ki is a finite CW-complex and the arrows are inclusion maps. We will use the reduced generalized K-theory $k^*(\ , Z_p)$ with coefficients in Z_p.

Remark 7.1. *The following two lemmas are proved in the work of Dranishnikov in his famous paper of 1987. The detailed proofs are quite technical and involved. We take them for granted.*

Lemma 1. *For each n we can find a prime p and a non-zero element* $\Delta_n \leq k^*(K_n, Z_p)$ *such that* $\Delta_n | s^4 \neq 0$. *Here the restriction map is the homomorphism induced by the inclusion map.*

Lemma 2. *Consider a prime p and any non-zero element* $\Delta_n \leq k^*(S^4, Z_p)$. *There exist an in¯nite dimensional compact metric space X of* $\dim_Z(X) = 3$ *and a continuous map* $f : X \not\leq S^4$ *such that* $f^*(\Delta) \not\leq 0$ *in* $k^*(X, Z_p)$.

≤ Now we consider the space ≡ cone$X_n = Y$. Clearly $\dim_Z(Y) = 4$. We claim that $\dim_Z(EY) \not\leq 5$. Suppose $\dim_Z(EY) \xi 4$. Then note that $Z = \equiv X_n$ is a closed subspace of Y and $\equiv f_n : Z \not\leq S^4$ is a continuous map. Hence this map can be extended to a map $EZ \not\leq S^4$. Since EZ is closed in EY and $\dim_Z(EY) \xi 4$, the map $EZ \not\leq S4$ can be extended to a map $f : EY \not\leq K(Z, 4)$. Since EY is compact, $f(EY) \Upsilon K_n$ for some n. Note that f restricted to the cone over X_n, defines a null-homotopy starting from f_n, that is, the map induced by $j_n \circ f_n$, where j is the inclusion map, in the k^* groups $k^*(X_n, Z_p) \not\leq k^*(K_n, Z_p)$ is trivial, a contradiction to the fact stated earlier. Hence $\dim_Z(EY) \not\leq 5$.

A further generalization

≤ The above result of Dranishnikov was again sharpened by Dydak and Walsh as follows, solving a problem of L. Rubin also :

Example 7.2. *[Dydak and Walsh, 1991] There exists a locally compact separable metric space X with* $\dim_Z(X) = 4$ *but* $\dim_Z(EX) = \zeta$.

≤ Looking to the example above, one will naturally like to know whether or not there are other compactifications, besides the Stone-Cech compactification, for which the results may be different. However this was quickly resolved. In the same paper, Dydak and Walsh also proved the following result :

Example 7.3. *[Dydak and Walsh, 1991] There exists a locally compact metric space X with* $\dim_Z(X) = 4$ *and* $\dim_Z(\Theta X) > 4$, *where* ΘX *is any Hausdorff compactification of X.*

There is yet another natural question which arises in the context of cohomological dimension theory. What happens when one uses singular cohomology instead of Cech cohomology in the definition of cohomological dimension? The answer is again quite noteworthy viz., then the most surprising result would be the following.

Theorem 7.1. *[Satya Deo* [12]*] The integral cohomological dimension of the Euclidean space* R^n *when one uses the singular cohomology, is infinite for* $n \not\leq 3$.

The above theorem is really a consequence of a very deep example given by Barrot-Milnor (see [1])in which they construct an example of a compact metric space X which has the

property that it has covering dimension r for any given integer $r \leqslant 2$, but its singular cohomology is nonzero in infinitely many dimensions $q > r$.

References

1. M. G. Barrat and J Milnor, *An example of anomalous singular homology*, Proc Amer Math Soc. 13 (1962) 293-297.
2. G. E. Bredon, Sheaf theory, GTM, Springer, 2004
3. G. E. Bredon, Introduction to compact transformation groups, Academic Press, 1972.
4. A. N. Dranishnikov, *On a problem of P.S.Alexandroff*, Mat. Sbornik 135, 551 (1988).
5. A. N. Dranishnikov, *Cohomological dimension is not preserved by the Stone-Cech com-pactification* Compte Rendus Bulgar Acad Science 41, 9-10, (1988)
6. Satya Deo, *One-dimensional manifold is of cohomological dimension two,* Proc. Amer. Math. Soc. 52, 445-446, (1975), MR 52 #15433.
7. Satya Deo, *Cohomological dimension of an n-manifold is n + 1,* Pacific J. Math 67, 155-160, (1976), MR 57 #4186.
8. Satya Deo, *Sheaf-theoretic cohomological dimensions and ¯nitistic spaces.* Proc. Amer. Math. Soc. 86, 545-550, (1982), MR 84b : 55010.
9. Satya Deo, *Large cohomological dimension and tauness* (with Ram Krishan and D.S.Jamwal) Jour.Aust Math Soc. 17, 49-51, (1985), MR 85k : 54041.
10. Satya Deo, *On cohomological dimension of a space and its Stone-Cech compactification* (with S.Muttepawar) Colloq. Math LV35-39, (1988), MR 89i : 54046.
11. Satya Deo, *Sheaf theoretic cohomological dimension and finitistics spaces* Proc Amer Math Soc 86, 545-550, (1982).
12. Satya Deo, *Cohomology theories best suited for algebric dimension theory* Math Student, Special Centenary Volume (2007).
13. Satya Deo, *Tautness in sheaf cohomology* Math Ann 263, 221-225, (1983).
14. Satya Deo and A. Pears *completely ¯nitistic spaces are finite dimensional*, Bull London Math Soc 17, 49-51, (1985).
15. J. Dydak and J. J. Walsh, *Infinite dimensional compacta having cohomological dimension two : An application of the Sullivan Conjecture* Topology 31 (1992).
16. J. Dydak and J. J.Walsh, *spaces without cohomological dimension preserving compactifications*, Proc AMS, 113, 1155-1162, (1991).

17. R. D. Edwards, *A theorem and a question related to cohomological dimension and cell-like mappings*, Notices of AMS, 25, A-259-A260, (1978).

18. W. I. Kuzminov, *Homological Dimension Theory*, Russian Math Surveys 23, 1-45, (1968).

19. K. Nagami, Dimension Theory, Academic Press, New York, 1970

20. L. R. Rubin and P. J. Schapiro, *Compactifications which preserve cohomological dimension, Glas. Math* Ser. 28(48), 155-165, 1993.

21. E. H. Spanier, *Algebraic Topology, McGraw-Hill, 1966.*

22. A. Zabrodsky, *On phantom maps and the theorem of H.Miller, Israel J Math,* 870, 129-143, (1987).

98th Indian Science Congress

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II

ABSTRACT OF

PLATINUM JUBILEE LECTURE

PLATINUM JUBILEE LECTURE

MODULAR FORMS, MOTIVES AND L-FUNCTIONS

President : **Dipendra Prasad***

SECTION OF MATHEMATICAL SCIENCES

(including STATISTICS)

I shall give an exposition on some of the questions of contemporary interest which relate Harmonic Analysis, Number theory and Algebraic Geometry— the unity offered by the Langlands program, whose success in the recent past has been enormous including the proof of the Shimura-Taniyama-Weil conjecture which proved as a consequence the Fermat's Last theorem.

**School of Mathematics, Tata Institute of Fundamental Research, Homi Bhabha Road, Mumbai 400 005.*

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III

ABSTRACT OF

YOUNG SCIENTIST AWARD PROGRAMME

YOUNG SCIENTIST AWARD PROGRAMME

Novel FCM Clustering Algorithms In Breast MRI

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The main motivation of Dynamic Contrast Enhanced Breast Magnetic Resonance Images (DCE-breast MRI) segmentation is to accurately identify the clear boundaries between the principal tissue structures in image volumes for diagnosing cancer portion. Many researchers have introduced various segmentation methods for medical images, however fuzzy c-means [FCM] based segmentation technique is more effective compared to other segmentation methods. But the traditional FCM works very poorly in the case of image which is affected by artifacts and heavy noise. This work aims to develop some effective segmentation systems based on fuzzy c-means for robust segmentation of DCE-breast MRI. The effective new objective functions of fuzzy c-means algorithms are constructed by incorporating the kernel induced distance measure, penalty terms, tolerance of the neighborhood attraction, additional entropy term and fuzzy parameters in this paper. In order to avoid the blindness of random initialization, and to reduce the computation complexity and running time of proposed algorithms, the algorithms initialize the initial cluster center using initialization algorithm. Experimental studies are carried out on the real contrast enhanced breast MRIs to show the performance of our proposed methods. In this paper, the Silhouette method is used to validate the segmentation accuracy of proposed method. Through the comparison of our proposed method with other existed methods, it can be shown that our methods are promising techniques to find clear boundaries between the tissues of breast MRIs, to handle large amount of noises, to have better results in dealing the image corrupted by noise, and other artifacts.

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IV

ABSTRACT OF

SYMPOSIUM/INVITED LECTURE

PROCEEDINGS
OF THE
NINETY EIGHTH SESSION OF THE
INDIAN SCIENCE CONGRESS

CHENNAI, 2011

PART II (Symposium/Invited Lecture)

SECTION OF MATHEMATICAL SCIENCES (including STATISTICS)

Symposium-1

NUMBER THEORY, COMBINATORICS AND SPECIAL FUNCTIONS.

Organizer : **A. K. Agarwal**

1. New combinatorial interpretations of Rogers identities

A. K. Agarwal

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Recently Goyal and Agarwal in (Further Rogers-Ramanujan identities for n-color partitions, communicated) interpreted some analytic identities of Rogers combinatorially by using partitions with "n+t copies of n" of Agarwal and Andrews (J. Combin. Theory Ser. A, 45 (1987), no.1, 40-49). In this paper we use lattice paths of Agarwal-Bressoud (Pacific J. Math. 136(1989), no.2, 209-208) to provide new combinatorial interpretations of the same analytic identity.

2. A formula for generating modular equations

S. Bhargava

Department of Mathematics,
University of Mysore,
Mysore

We present a master formula for a class of modular functions, derived by elementary manipulations of Ramanujan formulas which are themselves derived by simple means.

3. Cauchy-Davenport theorem: some generalizations and applications.

S. D. Adhikari

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If G is a finite abelian group, and A and B are subsets of G, then the direct problem for addition in groups is to find a lower bound for $|A+B|$ in terms of $|A|$ and $|B|$. The classical Cauchy-Davenport theorem is the first theorem in additive group theory. The result was proved by Cauchy in 1813 and was later rediscovered by Davenport in 1935. For a prime p, this theorem gives lower bound for $|A+B|$ in terms of $|A|$ and $|B|$, where A and B are nonempty subsets of $\Z/p\Z$. We give a proof of this theorem and discuss some generalizations and applications of it.

4. Some Number-Theoretic Functions And Their Applications

Chandrashekar Adiga

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In this talk we introduce several number-theoretic functions including Ramanujan's sum and Gauss sum and discuss some of their properties. We also show how Ramanujan's sum and Guass sum are useful in computing energies of certain graphs.

5. Strongly Regular Graphs and Quasi-Symmetric Designs

Sharad S. Sane

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A quasi-symmetric design D is a block design with the property every two blocks intersect in x or y points (where x and y are constant non-negative integers). Interest in quasi-symmetric design stems from the fact that graph associated with a quasi-symmetric design is a strongly regular graph, though not many families of quasi-symmetric designs seem to be known (other than some classical constructions). This talk will concentrate on mainly on the applications of Krein bounds for strongly regular graphs to the study of quasi-symmetric designs with no three blocks mutually disjoint. blocks.

6. The N-Vertex Splitting, N-Edge Splitting Operations for Graphs, Binary Matroids and their applications

M. M. Shikare

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Slater [J. Comb. Theory, 17(3)(1974), 281-298] defined the notion of n-point splitting for a graph in the following way : Let G be a graph and u be a vertex of G with deg u $_1 \leq n$ Let G_1 be the graph obtained from G by replacing u by two adjacent vertices u_1 and x, and if vertex x is adjacent to u in G, written x adj u_2, then make x adj u_1 or x adj u_2 (but not both) such that deg $u_1 \leq n$ and deg $u_2 \leq n$. The transition from G to G_1 is called an "n-vertex splitting operation".

Slater specifieded n-edge splitting operation [Slater] for a graph as follows : Let $e=uv$ be an edge of G with $d(u) \leq 2n-3$ where u is adjacent to $v_1, v_2, \ldots, v_h, w_k$ and h,k n–2. Let be the graph obtained from G by replacing u by two adjacent vertices u_1 and u_2 with v adj, u_1, v adj, u_2, u_1 adj v_1 (1 ξ i ξ h) and u_2 adj w_i wj (1 ξ i ξ k) and $d(u_1) \leq n$. The transition from G to is called an an "n-edge splitting operation".

Tutte [Indag. Math. 23(1961), 441-455] characterized 3-connected graphs in terms of 3-vertex splitting and 3-edge splitting operations where as Slater classified 4-connected graphs using 4-vertex splitting and edge splitting operations. We take a review of these results.

These operations can be extended to binary matroids. We consider the formulation of these operations in binary matroids. In matroids these operations will be called element splitting operation and es-splitting operation, respectively. We high- light significant properties of these operations in matroids and consider some of their applications.

7. Generalized Mittag-Leffler Function

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Let s and z be complex variables, the gamma function, and $(s)_v = \frac{*(s \quad v)}{*(s)}$ for any complex the generalized Pochhammer symbol. The principal aim of the paper is to investigate the function :

$$E^{\vartheta,q}_{\Delta,\mathrm{E}}(z) \equiv \sum_{n\vartheta=}^{\zeta *} \frac{(\vartheta)_{qn}}{(\Delta n \quad \mathrm{E})} \frac{z^n}{n!}$$

where Δ, E,$\vartheta \leq$ X; Re(Δ) > and Re(E) > 0, Re(ϑ) > 0 and $q \leq$ (0,1) □N.

This is a generalization of the exponential function exp (z), the confluent hypergeometric function I (ϑ, Δ; z), the Mittag-Leffler function $E_{\Delta}(z)$ the Wiman's function $E_{\Delta\mathrm{E}}$ (z) and the function $E^{\vartheta}_{\Delta\mathrm{E}}$ (z) defined by Prabhakar. For the function $E^{\vartheta}_{\Delta\ \mathrm{E}}$ z) its various properties including usual differentiation and integration, representations, recurrence relations, inequalities, Some integral Transforms, Generalized hypergeometric series form, Mellin-Barnes integral representation with their several special cases are obtained and its relationship with Riemann-Liouville fractional integrals and differential operators, Laguerre polynomials, Fox H - function, and Wright hypergeometric function also discussed.

8. On New Sixth Order Mock Theta Functions

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The present work deals with the study of certain sixth order mock theta functions introduced by Bruce C. Berndt & H. S. Chan (*Adv. Math.*, 216 (2007), no.2, 771-786).

9. Special Functions as a Source for Formulating Representations of Certain Lie Algebras

H. L. Manocha

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In the study of Lie Theory, representations of Lie groups and Lie algebras occupy a central place. Though a lot of research on representation theory is in progress, a need is being felt for formulating models of representations which enhance the credibility of its rich theory already available. Here, Special Functions have an abundant potential to play a creditable role. To move in this direction, there are several options. As one of the options, a second order Gauss differential equation is considered. By seeking the help of fundamental theorem of fundamental equations of mathematical physics, a Lie algebra in terms of differential operators, known as symmetry algebra, is formulated. This Lie algebra turns out to be an isomorphic image of the special linear algebra sl(4). It ends up in constructing a representation of sl(4) on the representation space consisting of hypergeometric functions.

10. A Brief Study On Some New Modular Equations And Their Applications

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Ramanujan devoted extensively to modular equations and their applications in Chapters

19-21 of his second notebook. Recently, we established several new modular equations in the classical theory as well as in the alternative theory, such as Schlafli-type, Russell-type, P-Q eta-function identities. As an application of these modular equations, we established explicit evaluations of continued fractions, class invariants, singular moduli and ratios of theta-functions.

11. On q-Transform Analysis And Its Applications

R. K Yadav

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The classical integral transform analysis has been an important tools to deal with the problems arising in Mathematical, Physical, Engineering and Biological Sciences. The corresponding developments in terms of the q-analogues of various integral transforms, q-Laplace and q-Melin transforms in particular, has further widened the scope for applications in solutions to the q-Integral and q-Difference equations. The present talk aims to highlight some of the results concerning the evaluation and applications of the q- Laplace and q-Melin transforms of a varied range of basic hypergeometric functions and q-Polynomials.

Symposium – 2
ECONOMETRICS AND TIME SERIES
Organizer : Anoop Chaturvedi

1. Geometric stable distributions and processes

Kuttykrishnan. A.P.

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Geometric stable distributions received much attention in recent years and their applications in different fields ranges from reliability to financial mathematics are well established by several researchers. It can be used in modeling peaked and heavy tailed observations that may be a result of a random number of independent innovations. Although the theory and applications

of geometric stable distributions is well developed and appeared in many literature in recent years, their applications in time series modeling are not developed. Present work aims at developing autoregressive model using geometric stable distributions as marginal distributions.

2. Detection of Multiple Outliers in Multivariate Data

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Recent advances in technology have enabled scientists to collect voluminous amount of data and analysts are devising methods to disseminate the data. However, datasets could contain "*unusual or outlying"* observations, which could distract the analysis and provide misleading results. So, it is important to have good methodology for dealing with outlying observations that might not be noticed in a typical data analysis.

The analyst has a choice to detect an outlier and remove it from the rest of the data before analysis is carried out or develop robust methods, insensitive to departures from underlying probabilistic model. Literature in statistics is abundant with the study on detection of outliers and robust techniques for dealing with unique data points (Barnett and Lewis, 1994).

The problem of detection of outliers in univariate data is fairly easy and simple plot of data could generally reveal the presence of outlying observations. However, multivariate outliers pose a bigger challenge as the visual methods simply do not work and is much more complicated with the increase in the dimension of the data. Classical Mahalanobis distance is found to be useful in dealing with outliers in multivariate data. Further, in contaminated data, the masking and swamping problems can be successfully overcome by using robust Mahalanobis distance obtained by replacing classical estimates with robust estimates. An attempt has been made to examine various robust measures using the parameters of success rate and false detection rate to detect multiple outliers for large dimensional data. **Barnett, V. and Lewis, T. (1994). *Outliers in Statistical Data*, John Wiley & Sons, Chichester, England.**

3. Fuzzy Clustering Using Credibilistic Critical Values

S. Sampath

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Handling of fuzzy data is predominantly a daunting task in data analysis because of the complicated data structures and unfriendly operators. The problem becomes more involved when one attempts to use data mining tools like clustering in the process of exploration on the existence of data clusters. Recently Sampath and Vaidyanathan (2010,2010a) have considered the usage credibilistic distances(Liu, 2008) and Sampath and Kalaivani(2010) have considered credibilistic critical values in clustering of fuzzy data to form crisp clusters of fuzzy data. In this paper, the usage of credibilistic critical values in fuzzy clustering of fuzzy data has been explored and a comparative study has been carried put based on certain fuzzy clustering validation measures with help of a real life data set.

4. A Systematic Approach for Unequal Allocations under Ranked Set Sampling with Skew Distributions

Neeraj Tiwari & Girish Chandra

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Ranked Set Sampling (RSS) is a useful technique for improving the estimates of mean and variance when the sampling units in a study can be more easily ranked than actually measured. Under equal allocation, RSS is found to be more precise than simple random sampling (SRS). Further gain in precision of the estimate may be obtained with appropriate use of unequal allocation. For skewed distributions, the optimum gain in precision is obtained through unequal allocation based on Neyman's approach, in which the sample size corresponding to each rank order is proportional to its standard deviation. However, the unavailability of the standard deviations of the rank orders makes the Neyman's approach impractical. The two models, viz.,'t-model' and '(s, t)-model' suggested by Kaur, Patil & Taillie (1997) are also impractical due to their dependence on population parameters of rank orders and complexities

in finding the optimum values of 't' and '(s, t)'. In this article, we propose a simple and systematic approach for unequal allocation for RSS with skew distributions. The proposed approach performs better than SRS and RSS with equal allocation. It also appears to perform better than the RSS with unequal allocation using't-model' and quite close to the '(s, t)-model' in most of the situations we have considered. The performance of the proposed procedure relative to existing models has been numerically evaluated for some skewed distributions.

5. Control Charts for Autocorrelated Data on 2-D Grid

Anoop Chaturvedi

Department of Statistics,
University of Allahabad,
Allahabad

The control charts are widely used to monitor the in-control state of the manufacturing processes. In several applications, observations show autocorrelation structure and the control charts based on independent observations for such data may lead to false conclusion that the process is out of control when actually the process is in control or vice-versa. In the present talk, the objective is to develop control charts when the observations are taken on a grid and show autocorrelation structure. The results have been applied to monitor the road pavement data taken on a 2-D grid to illustrate the results.

6. Generalized Murphy's test for multiple outliers in a linear model

Dr S. Lalitha

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University of Allahabad,
Allahabad

A test statistic based on Studentized residuals for detection of q outliers is proposed and its distribution theory under the null hypothesis that there is no outlier is present is discussed. It is shown that for a random sample with the value of q equal to two, the statistic reduces to the well known Murphy's test statistic. The results regarding percentile points are obtained for the case of three outliers using Bonferroni inequality. The performance of the test statistic is also studied for three outlier case.

Symposium – 3

ANALYSIS : SOME RECENT FACETS

Organizer **: Rajiv K. Srivastava, Agra**

1. On The Modified Consistency in the Bicomplex Space

Rajiv K. Srivastava

Head, Department of Mathematics,
Institute of Basic Science,
Dr. B. R. Ambedkar Agra University,
Agra

The Bicomplex space is not a Banach Algebra in the classical sense since the consistency between norm and multiplication is slightly modified.

We have studied the bicomplex space with focus on this modified consistency. The bicomplex space is partitioned into different components having specific behaviour with respect to the consistency. The components of the partition possess specific algebraic and topological properties.

In this talk, we present the structure of the partition of C_2 and some of our results related to the partition and the modified consistency.

2. Connecting Wavelet Transforms with Boehmians

P. K. Banerji

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This lecture is a brief sketching of the use of the wavelet transform, from mathematical point of view, to Mikusinski's regular operator, which later came to be known as the Boehmians. We intend to describe the same for the ultra-Boehmians and the integrable Boehmians and will minimize the use of Schwartz distribution, of which (however) Boehmians are said to be the generalization. Number of authors, namely V. Karunakaran and his associates (Madurai), S. P. Malgonde (Pune), M. S. Chaudhary (Kolhapur) have put in appreciable research on several aspects of Boehmians. But our venture in connecting the wavelet transform with Boehmians

may be considered maiden (prior our publications any such attempt is not found in the literature that is available). See for instance, Deshna Loonker and P. K. Banerji, *Wavelet transform for tempered Boehmians , Hadronic J. Suppl.* 18 (2003), 403-410; P. K. Banerji, Deshna Loonker and L. Debnath, *Wavelet transform for integrable Boehmians*, *J. Math. Anal. Appl.* 296 (2004), 473-478. The text will involve definitions and terminologies those have been used in these investigations.

3. Escaping Sets of Entire Functions

Anand P. Singh

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Let f be a transcendental entire function and fn, n 2 N denote the nth iterate of f. Eremenko defined an escaping set as

I(f) := {z 2 C : fn(z) ! 1 as n ! 1}.

A subset of I(f) in which the iterates of a transcendental entire function tend to infinity arbitrarily fast was considered by Bergweiler and Hinkkanen who defined the set A(f) : = {z 2 C : there exists L 2 N such that |fn(z)| > M(R, fn-L)for n > L}where M(R, f) = max|z|=R |f(z)|, R is any value such that R > minz2J(f) |z|, and J(f) is the Julia set of f.

An alternate definition of A(f) was given by Rippon and Stallard who defined the set B (f):= {z 2 C: there exists L 2 N such that fn+L(z) 62^fn(D), n 2 N} where D is an open disk meeting Julia set of f and eU denotes the union of U and its bounded complementary components. In this talk we give a survey of the results on the escaping sets and mention some of the open problems.

4. A Study of Growth of Basic Series represented by Clifford Valued Functions

G.S.Srivastava

Department of Mathematics,
I. I. T., Roorkee

M.A.Abul-Ez, in his Ph.D. thesis “Basic sets of polynomials in complex and Clifford

analysis" started the study of certain classes of special monogenic functions. The growth aspects of these functions were studied in various papers by R.De Almeida, R.S.Kraubhar, D.Constales and others. The asymptotic growth of entire monogenic functions was studied by R.De Almeida and R.S.Kraubhar. Their asymptotic analysis provides a powerful tool to study complex partial differential equations.

In this talk we present an overview of these studies which highlight the work done in this direction. It is interesting to note that many results like the coefficient characterizations of growth parameters run parallel to those for entire functions of one complex variable while some other properties are not so directly similar.

5. Differential Geometric Complex Analysis

Subhas S. Bhoosnurmath

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The classical complex analysis is more than hundred years old. Liouville's theorem, Picard's theorem, Montel's theorem, Riemann Mapping theorems are now well established facts.

But the recent entry of differential geometric techniques in complex analysis has led to new methods of proof and improvements of some results mentioned above.

In particular, we see considerable improvements in the statement of Liouville's theorem when we apply differential geometric approach in complex analysis. Ahlfors was the first mathematician to see differential geometric objects in complex analysis. In 1929, Ahlfors observed that Schwarz's lemma was just not a distance decreasing property of holomorphic function from unit disc to unit disc fixing the origin. Infact it was indeed an inequality involving a geometric object namely, the curvature of a metric. This approach has now revolutionised the current day complex analysis.

6. On Wavelet Sets

K. K. Azad

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University of Allahabad
Allahabad

An orthonormal wavelet whose Fourier transform possesses smallest support is known to be a minimally supported frequency (MSF) wavelet. The moduli of Fourier transforms of MSF wavelets are indicator functions on measurable sets of Lebesgue measure, known as wavelet sets. These definitions extend to higher dimensions as well. In this talk, we briefly survey some available constructions of wavelet sets and provide some methods to obtain certain classes of wavelet sets both in one as well as in higher dimensions.

7. Uniqueness of Entire Functions Sharing Certain Values with Derivatives

Indrajit Lahiri

Department of Mathematics,
University of Kalyani,
Kalyani, W.B.

The problem of entire functions sharing values with their derivatives is a special case of uniqueness of entire functions. In 1977 L. A. Rubel and C. C. Yang initiated this kind of problem. Afterwards a number of researchers like Mues, Steinmetz, Zhen, Wang, Yang, Yi etc. proceeded further with this problem. Now-a-days the uniqueness problem of entire functions sharing values with derivatives has become one of the most well explored branches of the value distribution theory. In the talk we discuss the gradual development of this branch starting from the result of Rubel and Yang.

INVITED AND SPECIAL LECTURES

1. EGZ theorem: Various proofs

S.D.Adhikari

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A prototype of zero-sum theorems, the EGZ (Erd\H {o} s, Ginzburg and Ziv) theorem

has played a central role in the development of the area of zero-sum theorems in Combinatorial Number Theory. We here present several proofs and some variations of this theorem.

2. Complex structures on circle bundles over complex manifolds

P. Sankaran

Department of Mathematics,
IMSc, Chennai

Calabi and Eckmann showed, around 1953, that the product of any twoodd-dimensional spheres admits complex structures. The work of Calabi and Eckmann has been extended in many directions in the recent years by many researchers. We shall outline a generalization giving rise to new families of compact complex manifolds which are product of two circle bundles as in the title. This is based on recent joint work Ajay Thakur.

3. A Characterization of Quasi-reflexive Banach Spaces

P. K. Jain

Department of Mathematics,
University of Delhi South Campus,
New Delhi

In this lecture, starting from the results of R. C. James [#Bull. Amer. Math. Soc. 50(1950); Ann. Math. 66(1957); Studia Math. 23(1964), Trans. Amer. Math. Soc. 113(1964); Israel J. Math. 13(1972)] and V. Klee [Rev. Cienc. (Lima) 52(1950)] concerning the results on reflexivity for Banach spaces, a characterization of quasi reflexive Banach spaces has been discussed.

4. ESCAPING SETS: An Overview

A. P. Singh

Central University of Rajasthan,
Ajmer

Several subsets of the escaping set have been defined and several interesting properties of this escaping set have been obtained. Here we plan to give a brie introduction and a survey on the escaping sets of entire and meromorphic functions.

5. Distribution of residues modulo a prime p

R. Thangadurai

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We consider the problem of distribution of several types of reduced residues modulo a prime p. In particular, those residues which are not a square, elements of a subgroup of cardinality more than $\sqrt {p} $.

6. Riemann Zeta function : A Brief

S. B. Nimse

Vice Chancellor,
SRTM University,
Nanded–431 606,
Maharashtra

In this talk I will speak about my joint work with one of my students giving a brief survey of the status of the Riemann Hypothesis until very recently.

7. Information technology for integrated rural employment generation programme.

E. Bhaskaran

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Government of Tamil Nadu,
Chepauk, Chennai–600 005

Rural Employment Generation Programme (REGP) has recorded its achievement in terms of creating employment opportunities to over 48 lakhs of rural people in India. There is need for study on the role of Information Technology (IT) for effective implementation of Prime Minister Employment Generation Programme (PMEGP). The Data Envelopment Analysis (DEA) reveals that due to the effective implementation of IT tools like E-tracking for new Entrepreneurs, E-module for Nodal Banks and Monthly Information System (MIS) for implementing agencies like KVIC, KVIB and DIC, there is increase in the Correlation and Technical Efficiency of State/UT-wise, Group-wise, Range-wise, Category-wise, Bank-wise performance variables.

98th Indian Science Congress

January 3-7, 2011, Chennai

V

ABSTRACT OF

ORAL/POSTER PRESENTATION

PROCEEDINGS
OF THE
NINETY EIGHTH SESSION OF THE
INDIAN SCIENCE CONGRESS

CHENNAI, 2011

PART II (Oral/Poster Presentation)

SECTION OF MATHEMATICAL SCIENCES (including STATISTICS)

MATHEMATICS

1. Analysis of Periodic Orbits In The Saturn-titan Systemusing Poincare Surface of Section Method

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We explore the regions of periodic and quasi-periodic orbits around both the primaries in the Saturn-Titan system in the frame work of planar circular restricted three-body problem. The location, nature and size of periodic and quasi-periodic orbits are studied using the numerical technique of Poincare surface of sections. The maximum amplitude of oscillation about the periodic orbits is determined and is used as parameter to measure the degree of stability in the phase space for such orbits. It is found that the family of orbits around Saturn remains around it and their stability increases with increasing value of Jacobean constant C, whereas the orbits around Titan move towards Titan as C increases. At C = 2.99, these orbits vanish. No periodic or quasi-periodic orbits could be found by the present method in the neighborhood of first collinear Lagrangian equilibrium point L_1 (0.9569373834...).

2. The Effects of Oblateness of The Massive Primary on the Periodic Orbits in the Restricted Three-body Problem

A. Safiya Beevi* and R. K. Sharma**

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**Vikram Sarabhai Space Centre,
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In this paper we have developed a series solution for periodic orbits around the more massive primary under the effect of oblateness using a perturbation technique. Taking the framework of the planar, circular, restricted three-body problem, the perigees of the orbits are calculated by varying mass ratio and oblateness. The study shows that the perigee of the orbits move towards the more massive primary or away from it depending on the period, mass ratio and oblateness. It is also observed that during this transition, for certain periods, the perigee of the orbit remains unaltered by the increase in oblateness coefficient.

3. Fuzzy Mathematical Approach for Performance Evaluation

A. K. Dalela

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Evolution of employee performance is one of the most important responsibilities of managers. Yet performance evolution has been the source of considerable dissatisfaction for both mangers and employees because of many shortcomings that have plagued evolution systems. On the basis of Drawing on research, experience and court rulings, in this paper Fuzzy mathematical solution for establishing an effective performance evolution system. Some of the guidelines cover the design of a system and other its administration. Performance evolution systems are the butt of many jokes and the source of considerable dissatisfaction.

4. Application of Number Theory Using A Simple Calculator In Cryptography

Udipto Chakraborty & Abhijoy Saha

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The text is about algorithmic number theory and its application to cryptography. Our main idea is to apply an algorithm using the unique properties of numbers to achieve a high strength encryption without using a computer or involving its intricate functions. We try to justify that a secure public key cryptosystem can be implemented to encrypt and decrypt messages successfully with the help of a simple electronic calculator.

The main discussion for encoding and decoding the message is preceded by a discussion of important definitions and theorems that are used in the text. The final protocol allows two users to exchange a secret key over an insecure medium and hence the final message with all110st little or no prior secrets, simply by application of a few basic mathematical operations.

5. On Quasi-conformally Recurrent Manifolds with Harmonic Quasi-conformal Curvature Tensor

Absos Ali Shaikh and Indranil Roy

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The main objective of the paper is to provide a full classification of quasi-conformally recurrent Riemannian manifolds with harmonic quasi-conformal curvature tensor. Among others it is shown that a quasi-conformally recurrent manifold with harmonic quasi-conformal curvature tensor is any one of the following : (i) quasi-conformally symmetric, (ii) conformally flat, (iii) manifold of constant curvature, (iv)vanishing scalar curvature, (v) Ricci recurrent. Also it is shown that a non-quasi-conformally flat, quasi-conformally recurrent manifold with harmonic quasi-conformal curvature tensor and non-vanishing scalar curvature is locally symmetric.

6. On Inclusion Relation Of Absolute Summability

Aradhana Dutta Jauhari and Pragati Sinha

Department of Mathematics,
I.E.T.M.J.P.R.U. Barielly

A theorem concerning some new absolute summability method is proved. Many other results some known and unknown are derived.

7. On Π-$|A|_K$ Summability Factors of Infinite Series

Aradhana Dutta Jauhari, Nayrirty Saxena and Pragati Sinha

Department of Mathematics,
I.E.T.M.J.P.R.U. Barielly

The present paper deals with absolute summability factors of infinite series. The result generalizes those of the result of Rhoades and Savas [4]; Sinha and Jauhari [5]; Kumar, Sinha and Mian [1] along with some new results.

8. Reflection Of Waves From Layered Porous Piezoelectric Half-space

Anil K. Vashishth*, Ashok K. Dahiya and Vishakha Gupta**

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Propagation of waves in a layered structured of porous Piezoelectric material on a porous Piezoelectric half-space bounded by fluid space on the upper side is investigated. The piezoelectric materials are assumed to have 6mm symmetry . The mathematical and physical formulation of the problem is stated according to the phenomenological theory of continuous media. The boundary conditions for mechanical displacements, stresses and electric displacements are analysed. The energy reflection and transmission coefficients are obtained in analytic form and numerical computation is done to study the effects of porosity and piezoelectricity on the phenomenon.

9. SH Wave Propagation in Periodic Porous Piezoelectric Layered Structure

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The propagation behavior of horizontally polarized shear waves in a periodic porous piezoelectric-polymeric layered structure is investigated. The layered structures consist of porous piezoelectric thin films bonded perfectly with polymeric thin films alternatively. The dispersion relation for the SH wave propagation in periodic layered structure are obtained for the case of wave propagating along the direction of layering and normal to the layering. The effect of porosity, frequency, thickness and shear modulus ratio of porous piezoelectric layer to polymeric layer on the phase velocity of wave is also studied numerically for a particular model.

10. Free Surface Flow of a Bingham Fluid

Ashwani Kumar Sinha[1], Alok Kumar[2] and Amit Kumar[3]

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[2]P.G. Department of Maths, Maharaja College, Ara
[3]Head Department of Maths, R.P.S. College, Chakeyaj,
Mahanar (Vaishali)

The Free surface of a Bingham fluid bounded below by a permeable bed is studied. The flow over the permeable bed is described by Bingham model. The flow in the permeable bed is according to Darcy's law. The velocity distribution, the shear stress, the mass flow rate and its fractional increase are obtained and the results are discussed numerically.

11. Study of The Askey-wilson Operator with Summation Formula

Ashwani Kumar Sinha

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M.M. Mahila College, Ara

The well known summation formula can be proved expanding each term in the identity $(I–x)^{-\Delta}\,(I–x)^{-E} = (I–x)^{-\Delta-E}$ by the binomial equating coefficients of x on both sides and relabelling Parameters. The aim of this paper is to use the Askey-Wilson Operator D_q and its intex lad $D_q^{\Delta} D_q^{E} = D_q^{\Delta\ E}$ to give a similar proof of the summation formula for a terminating very well poised ${}_6I_5$ series.

12. Stability of Equilibrium Points in Photogravitational Restricted three body Problem when Both Primaries are Triaxial Rigid Bodies and smaller one Oblate Spheroid and Bigger is source

Avdhesh Kumar* and B. Ishwar**

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In this paper we have examined the stability of triangular equilibrium points in the photogravitational restricted three body problem when both primaries are triaxial rigid bodies and smaller one oblate spheroid and bigger is source of radiation. We have found equations of motion and triangular equilibrium points of our problem. With the help of characteristic equation we have discussed stability conditions. Finally, triangular equilibrium points are stable in the linear sense. It is further seen that the triangular points have long or short periodic elliptical orbits in the same range of Π.

13. A New Approach to the Pell's Equation

Binayak Ghanti and Diptavo Dutta

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Pell's equation is one of the most important Diophantine equation because of its historical background and also of its enormous applicability. In this text we illustrate the origin of the Pell's equation from simple practical problems and consider certain important number-theoretic conclusions which principally involve a rigorous algorithm to interlink its solutions by a recursion relation. We have illustrated several important fields of application of the equation like approximating irrationals. Next we have put forward the Pell's equation as a bi-variate probability model both in the discrete case as well as in the continuous case. For the discrete probability model we have used the solution points of the Pell's equation as the points of non-zero probability. For the continuous model we have used the Pell function as a joint density deriving inequalities on the parameters and establishing certain new fields of its applicability

14. Decay of High Eccentricity Satellite Orbits with Air Drag using Uniformly Regular KS Canonical

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A non-singular analytical theory for the motion of high eccentricity satellite orbits under the influence of air drag is developed in terms of the Uniformly Regular Kustaanlleimo and Stiefel (uKKS) canonical elements, by assuming the atmosphere to be oblate with variation of density scale height with altitude. The series expansions include up to fourth-order terms of an independent variable $i1 = A^2$ (function of eccentric anomaly) and c (a small parameter dependent on the flattening of the atmosphere). Only two of the nine equations are solved analytically due to symmetry in the equations of motion. Comparison of the important orbital parameters semi-major axis and eccentricity up to 1000 revolutions, obtained with the present analytical solution $<$;1nd the KS theory, shows the superiority of the present solution over the KS elements analytical solution. The theory can be used effectively for the orbital decay of aero-assisted orbital transfer orbits during mission planning.

15. Fuzzy Mixture two Warehouse Inventory Model Involving Fuzzy Random Variable Lead Time Demand and Fuzzy Total Demand

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This paper considers a two-warehouse fuzzy-stochastic mixture inventory model involving variable lead time with backorders fully backlogged. The model is considered for two cases - without and with budget constraint. Here, lead-time demand is considered as a fuzzy random variable and the total cost is obtained in the fuzzy sense. The total demand is again represented by a triangular fuzzy number and the fuzzy total cost is derived. By using the centroid method of defuzzification, the total cost is estimated. For the case with fuzzy-stochastic budget constraint, surprise function is used to convert the constrained problem to a corresponding unconstrained problem in pessimistic sense. The crisp optimization problem is solved using Generalized Reduced Gradient (GRG) method. The optimal solutions for order quantity and lead time are found in both cases for the models with fuzzy-stochastic/stochastic lead time and the corresponding minimum value of the total cost in all cases are obtained. Numerical examples are provided to illustrate the models and results in both cases are compared.

16. Mathematical Modelling for Circular Motion of Satellites

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In this research paper we have developed a mathematical model for the cirular motion of satellites. As we know that thousands of problems can be and have been solved through mathematics. One principles of great importance to science and mathematics is the following :

Whenever we want to find the value of an entity, which cannot be measured directly, we introduce symbols x, y, z, ...to present the, entity and some others which vary with it, then

we appeal to laws of physics, chemistry, biology, economics or other branches of mathematics and use whatever information is available to us to get relations between these variables, some of which can be measured or are known and others which cannot be directly measured or are known and others which cannot be directly measured and have to be found out.

17. New Technique of Mathematical Modeling for Information and Communication Sciences

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In this research paper we have developed a new technique for translating real world problems into mathematical problems, solving the mathematical problems and interpreting these solutions in the language of the real world.

18 . The use of Fractional Calculus in Electromagnetic Theory

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In this paper, first we, give a brief review of the general principles, definitions, and some features of fractional derivatives/ integrals and then we review some of our ideas and findings in exploring potential application of fractions calculus in some electromagnetic problems.

19. New Hybrid Filtering Techniques for Emoval of Gussian Noise from Medical Images

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The most significant feature of diagnostic medical images is to reduce Gaussian noise which is commonly found in medical images and make better image quality. In recent years, technological development has significantly improved analyzing medical imaging. This paper proposes different hybrid filtering techniques for the removal of Gaussian noise, from brain tumor medical images, by topological approach. The filters are treated in terms of a finite set of certain estimation and neighborhood building operations. A set of such operations is suggested on the base of the analysis of a wide variety of nonlinear filters described in the literature. The quality of the enhanced images is measured by the statistical quantity measures: Root Mean Square Error (RMSE) and Peak Signal-to-Noise Ratio (PSNR).

20. Fuzzy Congruence on Semi Groups Versus Groups

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The main aim of this paper is to study a class of fuzzy congruence on semigroups and fuzzy inverse semigroup congruence on a semigroup. Further, we show that there is an one-to-one correspondence between the fuzzy seminormal sub semi group and the fuzzy inverse semigroup. Our purpose is to extend the idea of orthodox semigroup in the context of fuzzy semigroup.

21. On Entireness of Biocomplex Dirichlet Series

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In this work, we have used Bicomplex numbers (cf. [P1] [S1][S2] and [S3]) introduced the Bicomplex version of complex Dirichlet series $f(s) \equiv \sum_{n=1}^{\zeta} a_n e^{\mathrm{O}_n s}$. We have derived conditions for which the Bicomplex Dirichlet series is an entire Bicomplex Dirichlet series. The entireness of Hadamard product and sum of two entire Bicomplex Dirichlet series are also discussed.

22. L_p-approximation by Linear Combination of Summation Integral type Operators

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The present paper is a study of L_p-approximation by type operators. The error in the approximation is estimated in terms of the higher order integral modules of smoothness using some properties of the Steklov means.

23. Steady State of Revised Schrodingers Equation

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The revised steady state Schrodingers' is developed in this paper using the expressions from revised theory of matter waves. The revised Schrodingers' equation reduces to normal one in low velocity limit.

24. Observation and Importance of Cosmological Constant in General Theory of Relativity

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The mathematical concept of Hilbert - Space generalizes the notation of Euclidean space and extend the method of vector algebra and calculus from the 2 - dim. Euclidean plane and 3 - dim. Space to spaces with finite or infinite number of dimensions. A Hilbert - Space is an abstract vector space together with the additional structure of an inner product that allows length and angle to be measured. Hilbert - Spaces allow for many Elliptic PDE to be formed and by Lax-Milgram, can find basic tool in their analysis. With suitable modifications and techniques can be applied to Parabolic PDE and certain Hyperbolic PDE . Hilbert-Space form a basic tool in study of PDE & ODE.

25. Ordinary Differential Equation and Partial Differential Equation in Hilbert-space

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The large physical behavior of the universe hass been the subject matter of cosmology. Cosmologists have been trying to explain and predict such behaviour by constructing suitable mathematical models of the universe. The Einstein's General Theory of Relativity is the most promising tool. The theory considers Gravitation, which is the only long range intraction with net attractive force. In cosmology, empirical results have a different status from ordinary laboratory experiments. Indeed we have access to single Universe and cannot tamper with fate of the Uiverse by changing parameters as one would do in a laboratory experiment.

26. *Ig* Continuity and almost *Ig*-continuity

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In this paper, we study the notion of *Ig*-continuity. We, also introduce and study the notion of almost *Ig*-continuity which is weaker than *Ig*-continuity, *-continuity almost *-continuity.

27. On some Explicit Evaluation of the Ratios of Ramanujan's Theta–Function

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In this paper, we establish several new modular equations of degree 9 using Ramanujan's modular equations. We also establish several general formulas for explicit evaluation of $h_{9,n}$, $h_{9,n}$, $l\omega_{9,n}$, $l\omega_{9,n}$. As an application, we establish some explicit evaluations for Ramanujan's cubic continued fraction.

28. NEW IDENTITIES FOR RAMANUJAN'S CUBIC CONTINUED FRACTION

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In this paper, we present some new identities providing relations between Ramanujan's

cubic continued fraction $V(q)$ and the other three continued fractions $V(q^9)$ $V(q^{17})$ and $V(q^{19})$. In the process, we establish some new modular equations for the ratios of Ramanujan's theta functions. We also establish general formula for the explicit evaluations of ratios of theta functions.

29. Construction of a Scale Dependent Wavelet

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In this paper, the construction of an wavelet from its Multiresolution Analysis (MRA) is briefly outlined. The prototype scaling function _(x, h) is the compactly supported normalized trigonometric Bspline, which depends not only on the x-domain but also on the newly introduced scale parameter h. Unlike classical MRA's, the present MRA is obtained by scaling _(x, h) both in x-domain as well as in h-domain, and taking translations. In this construction, standard procedure like Fourier analysis of two-scale equation, z- transforms of analysis filters, and (generalized)autocorrelation function are used to design synthesis filters that leads to wavelet basis functions. These wavelets depend upon the scale parameter h.

30. Levels of Storage Inventory Model for Deteriorating Products with Lost Sales Via Stimulated by Time Above a Certain Stock Level under Inflation

Monika Vishnoi and S. R. Singh

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In this paper, a two warehouse inventory model for deteriorating items with linearly time dependent demand rate and partial backlogging under inflationary environment is developed. A rented warehouse (RW) is used when the ordering quantity exceeds the limited capacity of the owned warehouse (OW) and it is assumed that deterioration rates of items in the two warehouses may be different is considered. The demand rate is a linear function of the time and it is stimulated or fuelled by stock up to a certain level, thereafter it becomes constant. We allow for shortages in the owned warehouse and time dependent backlogging rate is considered. In addition, Due to different preservation facilities, geographical conditions and storage environment,

deterioration rates of items in the two warehouses may be different and inventory holding cost is considered to be different in different warehouses. Units are transferred from rented warehouse to owned warehouse in continuous release pattern. Further we use a numerical example to illustrate the model and sensitivity analysis.

31. Ability of Equilibrium points in the Perturbed Restricted three Body Problem when one of the Primaries is a Triaxial Rigid Body

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In this paper, we have discussed the effects of small perturbations in the coriolis and centrifugal forces on the locations and stability of equilibrium points. We suppose that one of the primaries is a triaxial rigid body with one of the axes as the axis of symmetry and its equatorial plane coinciding with the plane of motion. We conclude that triangular points are stable for and unstable for $0 < \Pi < \Pi_c$ and unstable for $\Pi_c\ \xi\Pi\xi\ \frac{1}{2}$, where Π_c is the critical mass value. The range of stability of triangular points decreases.

32. Proof for the Collatz Problem

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The Collatz problem, widely known as 3N+ 1 problem or Syracuse Algorithm, is an NP-hard problem, asks if repeated iterations of the function $C(x) = (3x + 1)/(2^a)$ always terminate in 1. This problem has gained a detailed insight in literature, whose prominence in additive number theory is exhibited by more than 1 00 publications in reputed journals. A novel approach has been implemented towards understanding the structure of the Collatz problem in this paper by introducing a mathematical model for an odd integer, which explains most of the observations seen earlier on this problem. The paper concludes by providing a proof for this problem.

33. An inventory Model with Volume Flexibility and Ailowable Shortage

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This paper develops a model to determine the optimal reliability and production rate that achieves the biggest total integrated profit for an imperfect production process under allowable shortage. In this system, production facility may shift 'in-control' state to an 'out-control' state at any random time. The basic assumption of the classical EPL model is that 100% of product is of perfect quality. But practically this is not true. More specifically, the paper extends the paper of Sana (S.S.Sana, 2010, "An economic production lot size model in an imperfect production system". European Journal of Operational Research 201, 158-170). Here we consider two type of production process in a cycle time. One is 'in-control' state at the starting of the production which provides conforming quality items and second one is 'out-control' state after certain time due to higher production rate and production run time. The proposed model is formulated assuming that a certain percent of total product which described by a function is defective. In this study we also consider that selling price of the units depends upon the unit production cost. Screening cost of the items are also taken in the propose model with shortages. The imperfect: quality items are reworked at a cost to restore its quality to the original one. The total cost function is illustrated by numerical examples and also its sensitivity analysis is carried out.

34. Mathematical Methods in Medical Image Processing

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In this paper, we describe some central mathematical problems in medical imaging. The subject has, been undergoing rapid changes driven by better hardware and software. Much of the software is based on novel methods utilizing geometric partial differential equations in conjunction with standard signal/image processing techniques. As part of this enterprise, researchers have been trying to base biomedical engineering principles on rigorous mathematical foundations.

35. On Product of Generalized Orlicz Spaces

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In the context of generalized Orlicz spaces, the two kinds of products viz the circle dot and the circle cross products are studied and conditions are obtained under which these spaces are contained in suitable space X_{I}.

36. On M-$|\bar{N}, p_n|_k$ Summability Factors of Infinite Series

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In this paper a theorem on M-$|\bar{N}, p_n|_k$ summability factors, which generalizes a theorem of SHARMA [4] has been proved.

37. On M-$|\bar{N}, p_n|_k$ Summability Factors of Infinite Series-II

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In this paper a theorem on M-$|\bar{N}, p_n|_k$ summability factors, which generalizes a theorem of SINGH and SHARMA [4] has been proved.

38. The Unsteady Hydromagnetic Flow of Visco-elastic Oldroyd Fluid of second Order due to a Periodic Pressure Gradient Hrough a Rectangular Duct

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The main object of this research paper is to study the unsteady flow of visco-elastic fluid under the action of a periodic pressure gradient through a non-conducting rectangular duct in presence of a transeverse magnetic field. At first, the general investigations have been presented to consider the titled problem. Secondly, two important deductions have been made, one for the unsteady velocity of Oldroyd second order fluid in absence of he magnetic field and the other for the unsteady velocity of the ordinary viscous fluid. Finally, the author investigates the titled problem including the two aforesaid deductions numerically.

39. Positive Operator Method and Validity of Principle of Exchange of Stabilities in Viscoelastic Fluid

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The theoretical treatments of convective problems usually invoked the so-called principle of exchange of stabilities (PES), which is demonstrated physically as convection occurring initially as a stationary convection. Weinberger used a method of a positive operator, a generalization of a positive matrix, to establish the PES, wherein, the resolvent of the linearized stability operator is analyzed which is in the form of a composition of certain integral operators. Motivated by the analysis of Weinberger and the works of Herron, our objective here is to extend this analysis of positive operator to establish the PES to more general convective problems from the domain of non-Newtonian fluid. In the present paper, the problem of thermal convection of a viscoelastic fluid in porous medium heated from below with variable gravity is analyzed and it is established by the method of positive operator of Weinberger that PES is valid for this problem, when g (z) is nonnegative throughout the fluid layer and the elastic constant of the medium is less than the ratio of permeability to porosity.

40. On * g Δ-compact and *g Δ Connected Spaces

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The notion of *g Δ closed sets in a topological space was introduced by R Devi rt. Al. [2]. In this paper, we introduce the concept of *g Δ US spaces, *g Δ compactness and *g Δ connectedness by utilizing *g Δ open sets and study their properties.

41. Z_{Π}closed Sets in Generalized Topological Spaces

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In this paper we define Z_{Π} closed sets and Z_{Π} open sets in generalized topological spaces. We obtain characterizations and properties of these classes of sets.

42. Non Linear Kronecker Product Lyapunov System on Time Scales – Existence, Uniqueness and Sensitivity Analysis

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In this paper, we establish the existence and uniqueness of the solution of the two-point boundary value problem associated with the non-linear kronecker product Lyapunov system on time scales

$$(X(t) \preccurlyeq Y(t))^{\vartheta} = (A(t) \preccurlyeq C(t))(X(t) \preccurlyeq Y(t)) + (X(\varsigma(t)) \preccurlyeq T(\varsigma(t)))(B(t) \preccurlyeq D(t))$$

$$+ (F_1(t_{\omega}, X(t)) \preccurlyeq Y(t))) \preccurlyeq (F_2(t_{\omega}, X(t)) \preccurlyeq Y(t))) \quad (1)$$

$$(M_1 \preccurlyeq M_2)(X(t_0) \preccurlyeq Y(t_0)) + (N_1 \preccurlyeq N_2)(X(t_1) \preccurlyeq Y(t_1)) = \Delta_1 \preccurlyeq \Delta_2 \quad (2)$$

Where A (t), B (t), C (t), D (t), X (t) and Y (t) are square matrices of order n. We assume that the components of A(t), B(t), C(t), D(t) are continuous functions $[t_0,t_1]$ and $F_1,F_2 : [t_0,t_1] \times R^{n_2 \times n_2} \preccurlyeq R^{n_2 \times n_2}$ are continuous and satisfy Lipschitz condition on closed interval $[t_0,t_1]$; we assume that $F(t,0) \not\equiv 0$ on $[t_0,t_1$. M_1, N_1, M_2, N_2,Δ_1 and Δ_2 are constant square matrices of order n by applying Bartles-Stewart algorithm and a modified QR-algorithm. The Kronecker product and kronecker sum are denoted by $\preccurlyeq$ and $\preccurlyeq$ respectively. We also present a sensitivity analysis of the general non-linear kronecker product Lyapunov system.

43. Common Fixed Point Theorem in Probabilistic Metric Spaces through Compatibility

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In this paper we have proved a fixed point and common fixed point theorems for expansive maps in Probabilistic Metric spaces through semi and weak compatibility. Due to its application in various disciplines of Mathematics and Mathematical Sciences, the Banach Contraction Principle has been extensively studied. Banach contraction principle yields a fixed point theorem for a diametrically opposite class of maps viz. expansive maps.

44. Free Energy of Mixing of two Molten Amalgams

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There are a large number of binary liquid alloys which exhibit interesting behaviour as a function of concentration as regards the thermodynamic properties. In the present work we have considered two amalgams at molten stage-sodium amalgam and potassium amalgam-and

tried to calculate their free energy of mixing (G_M) at different concentrations of mercury. Flory's model has been applied to study the asymmetric behaviour of G_M of them. For each alloy we have started with the mathematical expression for activity according to this model. Our computations explain the observed anomaly in the free energy of mixing of the present amalgams.

45. Reformulation Algorithm Convex/Concave Envelops for Logic based Optimization

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This paper treats convex/concave nonlinear envelops for odd power terms of the form X^{2k+1}, $(k \leq N)$ where $x \leq (a,b)$ and $a < 0 < b$. These envelopes are continuous and differentiable everywhere in [a, b]. A novel automatic reformulation method for non convex NLPs that include linear constraints and bilinear terms we also drive convex relaxations we compare both of these relaxations with relaxations for the same terms derived using other methods. The detail results of our present study will be displayed at the venue of congress meet.

46. On $(Lcs)_n$-Manifold

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T. Adati and A. Kandatu [Tensor (N.S.), 34(1980)] introduce the Lorentzian almost paracontact manifold with a structure of the concircular type. In this continuous A. A. Shaikh [Kyungpook Math. J. 43(2003), 305-314] introduced the notion of Lorentzian concircular structure manifold [briefly $(LCS)_n$-manifold] with an example which generalized the notion of LP-Sasakian manifolds introduce by K.Matsumoto [Bull.Yagamata Univ.Nat. Sci., 1989] and studied several properties. Extending the notion of $(LCS)_n$-manifold, in the present paper we study the Pseudo projective flat $(LCS)_n$-manifold with several properties. Among other interesting results we obtained necessary and sufficient condition for a 3-dimentional $(LCS)_n$-manifold is an space form. Also it is shown that a 3-dimentional $(LCS)_n$-manifold is K-Einstein and quasi-constant

curvature. Finally it is shown that a 3-dimentional Ricci semi-symmetric and 3-dimentional Ricci symmetric $(LCS)_n$-manifold is a space form.

47. On the Partial Convergence of Bicomplex Net

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The concept of partial convergence of the bicomplex net with different types of limit zones has been defined and developed. The paper is divided in three sections. Section 1, is introductory. In section 2, We have defined the partial convergence of the bicomplex net in the real order topology [**S2**] and have discussed the important role of the basis B4 of the real order topology in the partial convergence. In section 3, we have discussed the partial convergence of the bicomplex net in the idempotent order topology.

48. The Vector)) (x, O) Associated with the nxn Matrix Differential Operator

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In this paper the differential system , where L $\therefore$ =O$\therefore$, where L is the matrix operator, $\therefore$ is a vector having n components and O is a parameter real or complex with suitable boundary conditions has been considered.

Here the vector I(x,O) associated with the boundary value problem involving the above differential operator has been deduced.

49. Some Properties of Semi Open Set

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In this paper the definition of a semi open set has been taken. Here we have tried to study the properties of semi open sets analogue to the properties of open sets in a topological space

50. A Decomposition of *-Continuity

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In this paper, we introduce and study the notions of $I_{\Delta g}$-closed sets and $I_{\Delta}g$ continuity in ideal topological spaces. Also, we prove that a function $f : (X, \Omega I) \not\leq (Y,\varsigma)$ is *-continuous if and only if it Δ_1*-continuous and $I_{\Delta}g$ continuous

51. Common fixed points for Commuting and Compatible Maps on Compact Metric Spaces

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Compatible maps - a generalization of computing maps are characterized in terms of coincidence points, and common fixed points theorems for compatible maps and commuting maps on compact metric spaces are obtained. Mappings f,g : **E**≤ **E** are said to commute if fg=gf. Now any two self maps f and g of a set E commute on the set {x ? E;f(x=g(x))}of common fixed points of f and g. As we shall show, if f and g are continuous and E is compact metric, f and g compatible if they commute on the set{x HF; f(x) =g(x)} of coincidence points of f and g. The purpose of this paper is to consider and to emulate the relative metric of compatibility and commutativity of maps in the setting of compact metric spaces.

52. Kaehlerian Manifolds with Vanishing W-curvature Tensor and U-curvature Tensor

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The purpose of the paper is to obtain some of the properties of Kaehlerian manifolds with vanishing W-curvature tensor. Further some of the properties of W-recurrent Kaehlerian manifolds, W-symmetric manifolds and some of those of U-recurrent Kaehlerian manifolds, U-symmetric manifolds, with vanishing U-curvature tensor, are also considered.

53. An Analytical Method of Computation of Prime Numbers

S. K. Karnakar

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An algorithm for generation of large Prime Numbers have been developed by the author. This method has the unique feature in the sense that it is capable of computing Prime Numbers, as long as practicable, by calculating the residues of mod (P), P being the Prime Number, utilizing the well-known Fermat Little Theorem for Prime Numbers.

54. Characterizations of Conformally Flat Spaces

S. M. Bhati* and B. S. Waghe**

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In this paper, we consider the compact orientable Riemannian manifold M of dimension $n > 3$ admitting an infinitesimal conformal transformation X in M satisfying $L_x g_{ji} = 2Y g_{ji}$. We

have characterized the conformally flat spaces. We have obtained conditions in terms of integral formulas for M to be conformally flat without putting any restriction on the scalar curvature R of M. The results of Yano and Sawaki [8] are special cases of our Theorem.

55. Economic Ordering Quantity Model with Ramp Type Demand with Shortages Under Inflation

S. R. Singh* and Himani Dem**

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In this paper, a mathematical model is developed for items which are ameliorating as well as deteriorating in nature. Demand rate of the item is assumed to be a function of time known as ramp type function. Shortages are permitted and partially back-ordered. The back-ordering fraction is taken to be decreasing function of waiting time. We consider inflation and apply discounted cash flow in the problem analysis. Total cost of the system is formulated and optimal replenishment policy is derived, keeping in view the above factors of the system.

56. A note on Kaehlerian Manifolds with Vanishing Bochner Curvature Tensor

S. S. Pujar* and S. D. Devkhile**

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The purpose of the paper is to prove a theorem in a Kaehlerian manifold M with vanishing Bochner curvature tensor replacing the condition of constancy of scalar curvature and the length of the Ricci Tensor by the harmonic length of the Ricci tensor.

57. On Generalized MRecurrent, Concircular M-recurrent And Projective M- Recurrent Trans Sasakian Manifolds

S. S. Pujar and S. Naik

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K. K. Wagh Institute of Engineering Education & Research,
Panchwati, Nasik–422 003
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The purpose of the paper is to study some of the some of the properties of generalized M-recurrent and generalized Concircular M-recurrent Trans Sasakian manifolds and generalized projective M-recurrent and generalize the some of the results of [1] and some of those of [2]. Finally, we studied the properties of 3-dimensional generalized ?-recurrent trans-Sasakian manifold and some special cases of [13] are given.

58. On Degree of Approximation of Function Belonging to the Lipschitz by Almost (E, 1) (C, 1) Means Of Its Fourier Series

Sandeep Kumar Tiwari * and Chandrashekhar Bariwal**

* School of Studies in Mathematics,
Vikram University, Ujjain–456 010
**V/P Bharkhedi The Manasa Dist.,
Neemuch–458 110, Madhya Pradesh
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In this paper, a theorem on the degree of approximation of the function belonging to the Lipschitz class by almost (E, 1) (C, 1) product means of its Fourier series has been established.

59. Absolute Nevanlinna Summability of a Derived Fourier Series

Satish Chandra

Department of Mathematics,
S.M. Post Graduate College,
Chandausi–202 412

In this paper I have proved a theorem on absolute Nevanlinna summability of a derived Fourier series, which generalizes various known results.

60. Experiment and Innovation on a new Method of Teaching Mathematics

Shaligram Shukla

Department of Mathematics and Statistics,
Umesh Chandra College,
University of Calcutta,
Res Flat No. GA-43/6/2 Raj Bhallav Saha Lane,
Howrah–711 101

Mathematics has been defined from time to time as the abstract science which investigates deductively the conclusion implicit in the elementry conception of spatial and numerical retentions. Mathematics thus interpreted in various terms by different mathematics undoubtedly enables a man to study various phenomenon in space and establish varied type of relationship between them for exact interpretation to his ideas and conclusion and work' out mathematical results at the abstract level. But "how to teach" this subject is really a great debating problem to a teacher of mathematics, various methods evolved so far by different Institute of thought have the common characteristics that teaching must be based upon educand's experience of actual objects accompanied by a good deal of practice activity with a variety of problems useful and true to life. Basing upon all such principle a new method has been tried out with a famous geometrical theorem. Experimental findings also reveal that the new method is very much appealing to the students.

61. To Draw Another Line Segment when the Mean Proportional of the two Line Segments and one of the Line Segment are Given : A Geometrical Process by Introducing a new Geometric Property

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Government College of Engineering and Textile Technology,
Serampore, W.B.

There are various useful geometric methods to draw the mean proportional of two straight line segments when the two straight line segments are given. In this paper, here is a new geometrical process to find another line segment where the mean proportional & the one line segment are given.

Here I have introduced a new geometric property which will be proved here. By this property here I am introducing the new geometrical process of drawing another line segment where the mean proportional & one of the line segment are given. This property helps us to introduce the new geometrical approach.

62. Two Alternative Derivations of Optimal Quantity under Random Supply in Classical Newboy Setup

Tanushree Khandelwal, Shiva Gupta and Ayan Chandra

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In this paper we shall consider the classical newsboy problem. The problem is as follows: - A newspaper vendor starts his day with 'q' newspapers in his hand to meet a random demand. At the end of the day he may be left with some excess newspapers in his hands or may face shortage. Accordingly, he has to incur excess or shortage cost. The classical solution deals with finding the optimal value of 'q' by minimizing the expected total cost. The 'demand' mentioned here is the only random variable under consideration.

However, in most of the situations, it is possible that whatever is ordered is not what is received. We may consider the situation where the 'q' items received are inspected by an attribute characteristic and are classified as defective and non-defective. Only the number of non-defective items then constitute the real inventory and the fraction defective in the quantity received may depend upon various characteristics of the production process and hence vary randomly. Hence, the actual supply, here also, is another random variable along with the demand.

In this paper we shall consider two alternative methods of deriving the optimal order quantity :

1) We shall obtain the optimal order quantity 'q' by minimizing the expected total cost when both demand and supply are random under an exponential demand distribution.

2) We shall work out the optimal order quantity by minimising the probability that the total cost exceeds a specific (high) value. Here also, we shall assume that both demand and supply are random variables while demand distribution is exponential.

Some numerical examples have also been worked out.

63. Continuity of Intuitionistic Fuzzy Proper Functions on Intuitionistic Smooth Fuzzy Topological Spaces

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Department of Mathematics,
Alagappa University,
Karaikudi–630 003

We introduce intllitionistic fuzzy proper function between intuitionistic fuzzy sets. We investigate the relations among various types of intuitionistic continuity or intuitiollistic fuzzy proper function on intuitionistic fuzzy set and at intuitionistic fuzzy point belonging to the intuitionistic fuzzy set in the context of intuitionistic smooth fuzzy topological spaces.

64. Frobenius Partition Theoretic Interpretation of a Fifth order Mock Theta Function

M. Rana * and A. K. Agarwal**

*School of Mathematics and Computer Applications
Thapar University, Patiala
**Centre for advanced Study in Mathematics
Punjab University
Chandigarh–160 014
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Recently we gave two combinatorial interpretations of F_1 (q)-a fifth order mock theta function by using (n+2)-colour partitions and lattice paths. In this paper we give one more combinatorial meaning to the same mock theta function by using generalized Frobenius partitions. This results in a three-way combinatorial identity.

I. MATHEMATICS (POSTER PRESENTATIONS)

65. Unsteady MHD Laminar Convective Fluid Flow due to Orous Rotating Disk with Variable Properties ND Hall Effect

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In the present investigation, the unsteady MHD laminar convective fluid flow due to a porous rotating disk with variable properties of a electrically conducting fluid is studied. The fluid properties are taken to be strong functions of temperature while the induced magnetic field is neglected. The Hall Effect is assumed to exist as the electron -atom collision frequency assumed to be relatively high. The flow governing equations are transformed to ordinary differential equations by using similarity transforms and solved numerically. It is observed that the unsteady parameter' and variable properties have substantial effect on both velocity and temperature-profile.

II. STATISTICS (ORAL PRESENTATIONS)

66. On a Multistage Randomized Statistical test Structure

Moinak Bhaduri

Postgraduate Student (M.Stat.),
Indian Statistical Institute, Kolkata
E-mail : moinak.stats@gmail.com

In this paper, an effort has been made to show the strength of rejection of a parametric hypothesis explicitly by partitioning the critical and acceptance region into mutually exclusive and exhaustive subregions with appropriate rejection probabilities assigned. As a consequence, we note that apart from appreciating the logically superior test structure, one can achieve much flexibility in sense of reducing the probability of type-I error or increasing the power considerably epending on the partitions and the rejection probabilities. The analysis is organized in two sections: Section A introduces the idea along with the formal definitions, calculations, advantages etc. Some numerical examples have also been worked out. Section B concerns the more mathematical side, focusing on a special case.

67. Zipf's Law for Tamilnadu Cities and Towns (1951-2001)

A. Subbarayan,G. Kumar and V. Christopher Amalaraj

Department of Computer Applications,
SRM University,
Kattankulathur–603 203, Tamilnadu

The distribution of urban population takes place among settlements of differing sizes along a continuum from small towns to big cities. The process of urban growth is closely related to the size distribution of cities/towns. Only a limited number of statistical distributions have been used to study the size distribution of cities of countries or regions. Essentially, there have been just three: the Lognormal distribution, the Pareto distribution and a particular case of the later, the rank size distribution, known popularly as Zipf's law. Auerbach (1913), Singer (1936) and Zipf's (1949) demonstrated that the city sizes distribution could be approximated by a Pareto Distribution: $y = Ax^{-\Delta}$. Zipf's law collapses into the commonly used rank size rule. A better understanding of the Zipf's coefficient is crucial. The validity of the rank size rule hinges on this exponent having a value close to one. In this investigation we have computed the extent of downward bias of Zipf's law and studied pattern of the Pareto Coefficient.

68. Profit Analysis in a Commercial Mill System Having four Essential Components

V. K. Pathak[1], Hemant Sao[2] and H. L. Mankar[3]

[1]Govt. P.G. College, Dhamtari, Chhattisgarh
[2]M.P.C.C.E.T., Bhillai, Chhattisgarh
[3]Govt. College, Balod, Durg, Chhattisgarh

This paper analyses the profit analysis of a Commercial Mill having four essential components viz one main unit, three associate units. The three associate units perform almost identical work with the help of the main unit. The main unit acts as the driving force for the associate units. Only one repairman is used for repairing the failed components. Taking failure rates as exponential and repair rates as arbitrary, various system effectiveness measures .such as transition probabilities, mean time to system failure, availability, busy period of repairman are calculated. At last profit analysis is done on the basis or above measures.

69. Estimation of Parameters of Multinormal Distribution with Constraints

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Mardia et al (l989) considered the problem of estimating the parameters of nonsingular multivariate normal distribution with certain constraints. Nagmur (2003) considered the problem of estimating the mean sub-vector of non-sigular multivariate normal distribution with certain constraints. In this paper we try to estimate mean sub-vector under some different constraints and submatrix of ≡ with certain constraints for a nonsingular multivariate normal distribution.

70. Some New Demographic Equations in Survival Analysis under Generalized Population Model : Applications to Swedish and Indian Census Age-data for Estimating Adult Mortality

Subrata Lahiri

Professor and Head,
Department of Public Health and Mortality Studies,
International Institute for Population Sciences,
Deonar, Mumbai–400 088

This paper presents various formulas in estimating "10-year ***conventional*** and ***cumulative*** life table survival ratios", defined by the following ratios — $_5L_{x+10}/_5L_x$ **and** $T_{x+10}/T_{x\ in}$ life table terminology respectively, from two enumerations (not necessarily multiple of 5 years apart) of any closed population. The population under study should follow a generalized population model, and the age-specific growth curve should resemble closely to a second-degree polynomial. Attempts have also been made to establish algebraic relationships between census survival ratios (conventional and cumulative) and the corresponding life table survival ratios under GPM. The formulas, developed here, have been applied to a sufficiently accurate age-data of Sweden followed by those of India subject to serious response biases in age reporting. ***The proposed technique, which works quit well in assessing adult mortality even when the age-data are distorted due to age misreporting, may be extended for population projection and other demographic estimations.***

71. Different Approach to the Point Estimation through the Maximum P-value with a Set of Optimum Statistical Tests and some Important Properties of the Proposed Estimator

Monika Bhattacharjee

Student MStat 1 year,
Indian Statistical Institute, Kolkata

In this paper a different approach to the point estimation is shown to get a new estimator other than MVUE. The new estimator is based on the concept of p-value. Definition of p-value tells us that higher the p-value implies higher the probability of accepting the null hypothesis. On the basis of this concept the new approach suggests to put forward that value (proposed in simple null hypothesis) as the estimate where the p-value is maximum. 1n this paper this estimator is called "Maximum P-valued Estimator" or in short MPE. Here, the case of the estimating the unknown mean of a normal deviate with known variance is considered in details. Here, we empirically prove the unbiased and the consistency properties and discuss about the empirical Cramer's efficiency of MPE. The empirical comparison between MVUE and MPE in terms of their distributions and almost sure equality are also considered. The order of the MP estimator in Bayesian Inference problems is also discussed here.

72. A Simple Inequality of Moments in Some Classes of Multivariate Ageing Distributions

C. D. Bhavsar* and Dipti Bhavsar**

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Gujarat University, Ahmedabad–380 009
**C C Sheth College of Commerce,
Ashram Road, Ahmedabad
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Suresh R. P. (2001) considered an inequality of moments in some classes of bivariate multivariate ageing distributions. In this paper we extended their results for some classes of multivariate ageing distributions. We derive an inequality in terms of moments of multivariate IFR distributions. We then show that this inequality holds good for a larger class of multivariate ageing distributions such as NBU, NBUE and DMRL.

98th Indian Science Congress

January 3-7, 2011, Chennai

VI

LIST OF

PAST SECTIONAL PRESIDENTS

PAST SECTIONAL PRESIDENTS

Section of Mathematical Sciences (including Statistics)

A. K. Agarwal	(2010)	P. C. Vaidya	(1988)
B. K. Das	(2009)	A. R. Singal	(1987)
M. R. Adhikari	(2008)	M. P. Singh	(1986)
J. C. Misra	(2007)	H. C. Khare	(1985)
Bhola Ishwar	(2006)	S. K. Trehan	(1984)
M. A. Pathan	(2005)	R. P. Agarwal	(1983)
Shashi Prabha Arya	(2004)	V. Singh	(1982)
T. Parthasarathy	(2003)	B. K. Lahiri	(1981)
Mathematics		B. R. Bhonsle	(1980)
C. M. Joshi	(2002)	Dilip Kumar Sinha	(1979)
S. K. Malik	(2001)	K. M. Saksena	(1978)
P. V. Arunachalam	(2000)	M. K. Singal	(1977)
I. B. S. Passi	(1999)	M. C. Chaki	(1976)
Karmeshu	(1998)	Sri Rama Sinha	(1975)
V. Krishnamurthy	(1997)	R. S. Kushwaha	(1974)
H. P. Dikshit	(1996)	R. P. Bambah	(1973)
P. R. Sengupta	(1995)	T .Pati	(1972)
V. Kannan	(1994)	Ram Ballabh	(1971)
A. M. Vaidya	(1993)	S. D. Chopra	(1970)
N. K. Thakare	(1992)	Brij Mohan	(1969)
P. K. Bhatia	(1991)	Jagat Narain Kapur	(1968)
V. M. Shah	(1990)	U. N. Singh	(1967)
N. Rudraiah	(1989)	R. S. Mishra	(1966)

Hansraj Gupta (1965-1964)

C. T. Rajagopal (1963)

P.L. Bhatnagar (1962)

R. S. Varrna (1961)

V. G. Iyer (1960)

M. Ray (1959)

B. S. Madhava Rao (1958)

K. Chandrasekaran (1957)

R. N. Sen (1956)

B. R. Seth (1955)

S. K. Chakrabarty (1954)

V. V. Narlikar (1953)

B. B. Sen (1952)

C. Racine (1951)

N. M. Basu (1950)

S. Chowla (1949)

R. Vaidyanathaswamy (1948)

D. D. Kosambi (1947)

Ram Behari (1946)

Mathematics and Statistics

B. N. Prasad (1945)

B. M. Sen (1944)

S. C. Dhar (1943)

Mathematics

B. R. Seth (1942)

Mathematics and Statistics

M. R. Siddiqi (1941)

Mathematics

A. C. Banerji (1940)

Mathematics and Physics

K. R. Ramanathan (1939)

C. W. B. Normand (1938)

S. Datta (1937)

T. Royds (1936)

N. R. Sen (1935)

S. K. Mitra (1934)

A. L. Narayan (1933)

Ganesh Prasad (1932)

C. W. B. Normand (1931)

B. Venkatesach (1930)

S. N. Bose (1929)

J. de Graaff Hunter (1928)

D. M. Bose (1927)

Meghnad Saba (1926)

E.P. Metcalfe (1925)

C. V. Raman (1924)

T. P. Bhaskara Shastri (1922)

J. M. Field (1921)

N. A. F. Moos (1920)

D. N. Mallik (1919)

Wali Mohammad (1918)

Rev. D. Mackichan (1917)

Statistics

Bikas K. Sinha (2002)

M. L. Aggarwal (2001)

Arijit Chaudhuri (2000)

Kanwar SeD (1999)

Nikhilesh Bhattacharya (1998)

J. V. Deshpande (1997)

B. L. S.Prakasa Rao (1996)

Somesh Dasgupta (1995)

S. P. Mukherjee (1994)

B. K. Kale (1993)

K. R. Parthasarathy (1992)

J. K. Ghosh (1991)

S. R. Adke (1990)

S. K. Chatterjee (1989)

S. K. Mitra (1988)

O. P. Bagai (1987)

G. Sankaranarayanan (1986)

C. G. Khatri (1985)

K. C. Seal (1984)

Prem Narain (1983)

S. N. Singh (1982)

M. N. Das (1981)

B. R. Bhat (1980)

J. Medhi (1979)

Jogabrata Roy (1978)

B. D. Tikkiwal (1977)

Daroga Singh (1976)

B. N. Singh (1975)

T. V. Avadhani (1974)

N. T. Mathew (1973)

A. George (1972)