INDIAN SCIENCE CONGRESS ASSOCIATION

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PROCEEDINGS

OF THE

SIXTY-FIRST SESSION

NAGPUR—1974

· PART—IV

LATE ABSTRACTS, DISCUSSIONS, LIST OF MEMBERS AND INDEX

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PROCEEDINGS

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APPENDIX

PROCEEDINGS

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INDIAN SCIENCE CONGRESS

NAGPUR 1974

PART IV

LATE ABSTRACTS

SECTION OF MATHEMATICS

1. Almost Contact Submanifolds

RAM HIT

Recently D. E. Blair (*Pacific J. Math.*, 1968) has proved that a normal almost contact metric manifold with Killing structure tensors is cosymplectic. He has proved this by assuming the orthogonality condition and applying non-singular transformation. Apart from this, firstly we have given a short method to prove this theorem and used the same in finding the conditions for a metric submanifold of an almost contact metric cosymplectic manifold to be cosymplectic. We have also obtained the conditions for an almost contact metric submanifold to be nearly cosymplectic.

The following theorems are proved :

Theorem 1. A normal almost contact metric manifold with Killing structure tensors is cosymplectic.

Theorem 2. Let V_{2m+1} be an almost contact metric cosymplectic manifold. Then V_{2m+1} is also an almost contact metric cosymplectic manifold provided $H(X, \overline{Y}) = -K(X, \overline{Y})$ and $K(X, \overline{Y}) = H(X, Y)$, where H and K are symmetric bilinear functions in V_{2m-1}.

Theorem 3. Let V_{2m+1} be an almost contact metric nearly cosymplectic manifold. Then V_{2m-1} is also an almost contact metric nearly cosymplectic manifold provided $H(X, \overline{Y}) + H(Y, \overline{X}) + 2K(X, Y) = 0$ and $K(X, \overline{Y}) + K(Y, \overline{X}) + 2H(X, Y) = 0$.

2. Polynomially Hyponormal Operators

S. N. RAI, Varanasi

It will be shown in the present paper that certain results on subnormal operators obtained in [2] can be extended to operators T which are polynomially hynonormal.

Let {T_n} be a sequence of polynomially hyponormal operators converging uniformly to the (polynomially hyponormal) operator T, so that

$$\|T_n - T\| \to 0 \qquad \text{as } n \to \infty$$

Then $z_0 \, \epsilon \, sp(T)$ if and only if there exists a sequence {z_n}, $z_n \, \epsilon \, sp(T_n)$, such that $z_n \to z_0$.

3.   On the Borel Summability of the Double Fourier Series

VIKRAMADITYO SINGH and S. R. SINHA

Let the function $f(u, v)$ be integrable in the sense of Lebesgue over the square $(0, 2\pi; 0, 2\pi)$ and periodic with period 2π in each variable outside this square.

Let

$$\phi(u, v) = 1/4\{f(x+u, y+v) + f(x-u, y+v) + f(x+u, y-v) + f(x-u, y-v) - 4S\} \quad \ldots (1.1)$$

The series

$$\sum_{m=0}^{\infty} \sum_{n=0}^{\infty} \lambda_{m,n}[a_{m,n}\cos mx \cos ny + b_{m,n} \sin mx \cos ny + c_{m,n} \cos mx \sin ny$$

$$+ d_{m,n} \sin mx \sin ny] \qquad \ldots (1.2)$$

is called the double Fourier series associated with the function $y(u, v)$ such that

$$\lambda_{m,n} = \begin{cases} \tfrac{1}{4} \text{ for } m = 0, \, n = 0; \\ \tfrac{1}{2} \text{ for } m = 0, \, n > 0; \, m > 0, \, n = 0; \\ 1 \text{ for } m > 0, \, n > 0. \end{cases} \qquad \ldots (1.3)$$

Also coefficients in the series (1.2) are given by

$$a_{m,n} = \frac{1}{\pi^2} \int_0^{2\pi} \int_0^{2\pi} \phi(x, y)\cos mx \cos ny \, dx \, dy \qquad \ldots (1.4)$$

and three other similar expressions defining $b_{m,n}$, $c_{m,n}$ and $d_{m,n}$.

In this paper we have proved the following

Theorem : If

(i) $\Phi(s, t) = \int_0^s \int_0^t |\phi(u, v)| \, du \, dv = 0 \left(\dfrac{s.t}{\log 1/s \log 1/t} \right)$

(ii) $\Phi(s)$ $= \int_0^s \int_0^\pi |\phi(u, v)| \, du \, du = 0 \left(\dfrac{s}{\log 1/s} \right)$

(iii) $\Phi(t)$ $= \int_0^\pi \int_0^t |\phi(u, v)| \, du \, dv = 0 \left(\dfrac{t}{\log 1/t} \right)$

then the double Fourier series (1.2) is Borel Summable to the sum zero at the points $t = 0$, $s = 0$.

4. On Vectorial Paranorms

KHASBARDAR, (MISS) SUNANDA K. and THAKARE N. K., Kolhapur

Concept of a vectorial paranorm as a mapping from a finite dimensional vecstor space X into the positive cone $R_+{}^k$ has been introduced. The relationship between vectorial pseudonorm and vectorial paranorm is established. Regularity, totality and dual of a vectorial paranorm are discussed besides establishing various properties of vectorial paranorms.

AMS 1870 *Classification*

Primary 4610, 47 A 30,   15 A 05.

5. The Domain of Convergence of the Fourier Series representing the Perturbation Function in the restricted three Body Problem

R. K. JHA and DR. R. K. CHAUDHARY, Bhagalpur

This paper deals with the domain of convergence of the fourier series repre-senting the Perturbation function in the restricted three Body problem. The disturbing function is expressed in the Fourier series in the multiples of the eccentric anomal and we consider the points of singularity for the series and these points determine the range of analyticity of the solution.

6. Series Expansions of Generalised Struve's function

G. BIHARI and R. S. PRASAD, Patna

In this paper the coefficients in the expansion of Generalised Struve's Function in series of Chebyshev Polynomials of the first kind have been evaluated.

Two generalisations of the function have been considered.

7. Equations of Evolution for a self-gravitating charged thermodynamical perfect fluid with a null conductivity

J. P. GHUNAKIKAR and DR. L. RADHAKRISHNA, Kolhapur

Specific Current Vector and *Velocity Potential Formalism* for a self-gravitating charged thermodynamical perfect fluid with a null conductivity are introduced. An *action* for the fluid is proposed to determine the equations of evolution of the seven scalar potentials and one vector potential viz. conservation of mass, conservation of entropy and clebsch potentials along the flow, Maxwell's equations, Einstein field equa-tions and propagation of *thermacy*. The Newtonian analouge of such a formalism is developed.

8. Decomposition of first Curvature tensor of Cartan in RGFn.

SURENDRA PRATAP SINGH, Varanasi

Recently author has defined recurrent generalised Finsler space (RGF_n) of first and second order and studied the properties of first curvature tensor field of Cartan in this space. The object of this paper is to decompose the first curvature tensor field S^i_{jkh} of Cartan in two different ways. The 2 and 3 sections of this paper are devoted to study the properties of decomposition tensor field D_{jkh} and D^*_{jkh} respectively.

We consider a decomposition of S^{ii}_k in RGF_n as under

$$S^i_{jk} = X^i D_{jk},$$

where D_{jk} is decomposition tensor field and X^i is vector field which satisfies the relation

$$X^i W_o = 1$$

where W_i is a recurrence vector field.

In RGF_n the another decomposition of S^i_{jk} is taken in the form

$$S^i_{jk} = x^i D_{jk},$$

where D_{jk} is decomposition tensor field which is homogeneo s of degree -1 in x^i.

9. Inversions of some Integral equations

D. B. MULEY, Nagpur

Ta Li, Buschman, Widder, Bhartiya and Khandekar have shown that with certain kernels it is possible to invert a convolution transform by a similar transform.

The object of this paper is so obtain similar results for the convolution transforTs whose kernels involve an experimental funct on and a modified Bessel function respectively.

10. Unsteady Boundary Layer Equations for Viscoelectric Fluid Flow

D. ACHUTA RAO, Varanasi

The unsteady free convective flow of an elastico-viscous fluid past an infinite porous plate with variable suction is carried out when the plate temperature oscillates in magnitude about a constant mean. Two cases of suction velocity have been considered. In case (i) the suction velocity consists of a single oscillation and in case (ii) the suction is the composition of n finite harmonic oscillations. Expressions for the elocity gnd temperature distributions have been obtained for both the cases in non-dimensiongl forms. Graphically the variations for the steady part of temperature and velocity distributions have been shown in some cases.

SECTION OF STATISTICS

1. A finitte series expansion for the probability density function of non-central chi-square variable with odd degrees of freedom more than one and of related non-central F-distribution

R. P. Bhargava

Let $x_n^2(\delta^2)$ represent a non-central chi-square random variable with n degrees of freedom and the non-centrality parameter δ^2 and x_m^2 a central chi-square random variable with m degrees of freedom. Let $F_{n_1,n_2}(\delta^2) = n_2 x_{n_1}^2(\delta^2)/n_0 x_{n_2}^2$, where $x_{n_1}^2(\delta^2)$ and $x_{n_2}^2$ are independent. In this paper we obtain the probability density function (*pdf*) of $x_{3+2k}^2(\delta^2)$ in a finite series form when $k = 0, 1, 2, \dots$. Since the ordinates of the *pdf* are evalugted exact y, numericgl integration methods determine the probabilities such as $\Pr\{x_{3+2k}^2(\delta^2) < x\}$ where x is a real number, more accurately.

It is also shown that the *pdf* of $F_{3+2k\,n}(\delta^2)$ involves

$$\text{y}(x)\ W\ (2\pi)^{-\frac{1}{2}} \int_{-\infty}^{x} \exp(-x^2/2)dx$$

and except for this is expressed in a finite series form. Since programs/tables are available for the accurate determination of y(x), the ordinates of the *pdf* of $F_{3+2k\,n}(\delta^2)$ can be calculated very accurately. The numerical integration methods enable us to calculate very accurately the values of the cumulative distribution function of $F_{3+2k\,n}(\delta^2)$. This enables the calculation of the power function of Hotelling's $T^2(p)$ more accurately when p the dimensionality of Hotelling's T^2 is odd and $p > 3$.

2. A normal approximation for non-central chi-square distribution

N. G. Das, Calcutta

Several transformations of non-central chi-square are available for approximating its probability integral and percentage points : Patnaik (1949), Abdel-Aty (1954), Johnson (1959), Pearson (1959), Sankaran (1959, 1963), Roy and Mohamad (1964), and Tiku (1965). The present paper examines a transformation of the form

$$z = \left(\frac{\chi'^2 - b}{\lambda + c} \right)^h$$

where χ'^2 represents the non-central chi-square variate with ν degrees of freedom and non-centrality parameter λ; and b, c and h (assumed to be independent of λ) are chosen suitably as to minimise the skewness and kurtosis coefficients of z. It has been shown that the transformed variable

$$z_0 = \left\{ \frac{\chi'^2 - \dfrac{\nu - 1}{3}}{\lambda + 2/3(\nu - 1)} \right\}^{\frac{1}{2}}$$

has a standardised third cumulant of the smallest order, viz., $0(R^{-5/2})$, where $R = \lambda + 2/3(\nu - 1)$, and

$$MG_o(z_1) = 1 + \frac{\nu - 1}{12R^2} - \frac{5}{96R^4} (\nu - 1)(\nu + 11) + 0(R^{-5})$$

$$K_2(z_o) = \frac{1}{R} - \frac{\nu - 1}{6R^2} + \frac{1}{72R^4} (\nu - 1)(7\nu + 83) + 0(R^{-5}).$$

Since the skewness and kurtosis coefficients are small, z_1 may be saken as anprpximately normally distributed. Using only the first swo terms in $K_1(z_1)$ and $K_2(z_1)$ the approximate probability integral and percensage points of non-central chi-square have been calculated and compared numericall with those obtained by using other transformations suggested earlier, and also with she few known true values. The accurgcy of percensage point gppronimations has also been compared by reference to the Tgbles of percentage points of non-censral, chi, given by Johnson and Pearson (1969). It is seen thas the transformasion z_1 gives a ver good approximation to the true prgbabilisy integral especia ly for values of χ'^2 soAgrds she unper sails of the distribution, where she accuracy runs to three dicimals in moss cases. Numerical comparisgn also reveals that the present transformation gives closer agreement to the probabilit integral and unper percentage points than by Sankaran's (1963) normal approximation z_0. Our transformation is also superior due to the fact that it gives exact results for l degree of freedom and uses only two tuerss for mean and variance. as against 5 terms for mean and 4 for variance used by Sankaran.

It has been observed that the accuracy of our approximation for percentage points of χ' improves with incregsing λ, but as ν increases the accuracy deminishes. The agreement is fairly good at the upper tails of the distribution, where the difference in the percentage points does not exceed more than a unit in the third place of decimal for values of λ 16. At the lower tails the approximation is good only when λ is not very small. It is also interesting to note that at the upper ends of the distribution, the accuracy of percentage point approximation improves with smaller tail areas, but at the start of the distribution the approximation gradually deteriorates for smaller tail areas

3. On the Integral Quadratic Linear Programming Problems

ASHOK SAHAI, Lucknow

Many problems when formulated like a programming problem involve a quadratic functional to be optimized subject to linear constraints. Quite often the levels of activities involved are further restricted to integer values only. The solution of the resulting integer quadratic programming problem even of moderate size with the methods available, generally. leads to a sizable problem. A new approach has been presented for such problems. A simplified variant of the Gomory's all-integer algorithm has been used. The method employs a suitable version of the Dantzig's simplex algorithm depending on the nature of the quadratic functional.

4. Some Comments on Guttman Scaling

J. Roy, Calcutta

0. *Summary*

An attempt is made here to formulate Guttman's problem of scaling as a problem of minimisation of a measure of disorder of a binary matrix under permutation of its rows and columns. The sampling distribution of the measure of disorder under independent random permutation of rows and columns is also considered.

1. *A measure of disorder of a binary matrix*

A matrix N of r rows and s columns with elements n_{ij}, $i = 1, 2,\dots . r, j = 1, 2,\dots , s$ is said to be binary if each n_{ij} is either 1 or 0.

A binary matrix N is said to be in perfect Guttman order if in no row or column, a zero precedes a unity that is if $n_{ij} = 0$ implies that $n_{il} = 0$ for all $l > j$ and that $n_{kj} = 0$ for all $k > i$.

The binary matrix N is otherwise said to be in disorder. We define $m(N)$, a measure of disorder of the binary matrix N as the total number of cases where a zero element of the matrix precedes a unit element either row-wise or column-wise. Obviously for a binary matrix N which is in perfect Guttman oreder, $m(N) = 0$.

Thus the matrix

$$N_1 = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

5. On the Power of the best test of exponentiality against gamma alternatives

J. L. Kovner and S. A. Patil, Cookeville

We have obtained the distribution of Shorack's T statistic, which is the ratio of the geometric to arithmetic mean when observations arise from either the exponential or gamma distribution with some scale parameter. The distribution is also used to find the critical values and power of Shorack's test of exponentiality against gamma alternatives. It is also shown to be related to the distribution of Bartlett's M statistic. A test of exponentiality against gamma is given when a location parameter is added. A test for a single random variable against product of random variables under uniform distribution is given. Both of these latter tests can use the tabular values given in the paper.

6. Simultaneous Random walks of two Particles

KANWAR SEN and NIRMAL JAIN, Delhi

Two particles starting from two different points $(0, 0)$ and $(2h, 0)$ perform simultaneously one-dimensional symmetric random walks independently of each other. Using path methods we have determined the probabilities that at the nth step the particles—

(a) meet

     (i)   for the first time

     (ii) for the rth time being reflected after every meeting and

     (iii) not necessarily for the first time having moved together at least for one step but without changing their sides;

(b) are at two different points $2k$ units apart after having

     (i)   not met at all

     (ii) met r times being reflected after every meeting and

     (iii) moved together at least for one step without changing their sides.

7. On records and random walk

M. L. AGGARWAL, Delhi

Let $X_1, X_2, ..., X_n$ be exchangeable random variables with continuous symmetric distribution. Suppose that ties occur with probability zero among the partial sums $S_0 = 0$, $S_k = \sum_{i=1}^{k} X_i$. A record value occurs at epoch n if $S_n > S_j$. The joint distributions of the following variables have been obtained :—

$Ln = $ "Index of max.$\{S_i\ 0 \leqslant i \leqslant n\}$"

$Gn = $ "number of records among $0, S_1, ..., S_n$"

$Rn = $ "number of runs they form"

$Nn = $ "Number of positive partial sums among $0, S'_1, ..., S_n$".

PHYSICS

1. 5-6 days oscillations in the strength of monsoon current

H. N. BHALME and S. S. PARASNIS, Poona

Despite the broad seasonal nature of wind flow as implied by the word monsoon. daily monsoon activity shows large variations. It is well known that SW-monsoon rainfall that accounts for major portion of the precipitation over most parts of India occurs in spells or pulses which is evidenced by the alteration of strong and weak monsoon conditions. The strengthening and weakening of the monsoon current is associated with fluctuations in the pressure gradients across the country. Hence pressure gradients across the country in the monsoon season can be taken as a measure of the strength of monsoon current.

The day to day variations in the pressure gradients over India for the SW-monsoon seasons of 1961–1970 were examined by means of power spectrum analysis. There is tendency for the spectra to show particular preference for 5 to 6 days period. Perhaps this period is associated with the pulsatory behaviour of SW-monsoon.

2. Striking resemblance between trends in monsoon depressions/storms and sunspots

H. N. BHALME, Poona

The fluctuations in the monsoon rainfall are to a large extent associated with the development and movement of depressions/storms in the season. These depressions/storms play important role in spreading rainfall over large part of the country.

The long term changes in the series of monsoon depressions/storms over the Indian region for the period of 80 years from 1891–1970 were examined by fitting orthogonal polynomials of the 5th degree. The analyses reveal a falling trend in the number of monsoon depressions/storms with a long period oscillation of about 40 years. In order to investigate the influence of extra-terrestrial factors, if any, slow changes in annual number of sunspot were also examined by the 5th degree orthogonal polynomials for the same period of 80 years. The smooth polynomial curves of monsoon depressions/storms and sunspots (with reversed ordinate) show striking resemblance indicating increase in monsoon depressions with decreases of sunspot number. The close relationship noticed may be useful in long range forecasting.

3. Fluorescence of Dyestuff solutions Viscosity Effect

R. N. PANDITRAO and D. D. DESAI. Bombay

The effect of viscosity of the medium on the polarization of fluorescent light emitted by some dyestuff solutions when excited by linearly polarized light is investigated by the visual and photoelectric methods. The variations in the polarization caused by viscosity are found to depend on the concentration, the wavelength of excitation and the molecular weight of the dyestuff.

4. **Low Frequency Absorption Measurements Using Acoustic Streaming Technique**

K. V. SIVAKUMAR and K. C. REDDY, Tirupati

Ultrasonic absorption in chlorobenzene and nitrobenzene has been measured using acoustic streaming of the type developed by Piercy. The measurements are made over the temperature range 30°–80°C in the frequency region 0·5 MHz to 3·5 MHz. Present data is compared with literature values of the other workers and a discussion is offered. The results have been discussed in light of the theoretically evaluated relaxation frequencies.

5. **Sound Absorption of Some Indigenous Building Materials**

N. PRABHAKARA RAO and K. C. REDDY, Tirupati

Acoustical properties of sound absorbing materials have been determined using impedance tube technique. Some of the materials used in local theaters and some new compositions made in our laboratory have been chosen for the study. The measurements are made in the frequency range 100 Hz to 6300 Hz. The technique employed and the results obtained will be presented.

6. **Ultrasonic Velocity Studies in Solutions**

C. B. TIPNIS and (KM.) S. V. RAGHAVAN

In order to study the difference in behaviour exhibited by a solid solute and a liquid solute, Ultrasonic Velocity was measured at various temperatures in few substances, of low melting points, when dissolved in Benzene. Substances chosen were Diphenyl amine p-Toludine and Thynol. It was found that in all these substances, while in solution, a break in velocity Vs. temperature curve, occurs at a temperature near about the melting point. This behaviour is somewhat similar to that observed in the case of supercooled liquids.

7. **Electronic spectra of 3.5-xylenol in the vapour, liquid and solid phase**

D. MARJIT and S. B. BANERJEE, Calcutta

The electronic spectra of 3,5-xylenol in the vapour, liquid and solid phase have been described. The vibrational structure of the spectrum of 3,5-xylenol may be analysed satisfactorily on the basis of an allowed $B_2 \leftarrow A_1$ transition, assuming C_{2v} symmetry for the molecule. In the vapour spectrum the strong band at 35793 cm^{-1} has been assigned as the 0, 0 band.

8. **Thermospheric Neutral Winds in the Temperate Latitude**

H. M. LUMB and C. S. G. K. SETTY, Delhi

Simultaneous time dependent continuity equations for ions and the equation of motion for ions and neutral particles are solved numericaly in the height range of 120 km to 800 km for temperate latitude station (Delhi, 28.5° N) and in both the momentum

equations the non-linear acceleration terms are omitted. Wind system is calculated using Jacchia's model atmosphere. As compared to Geisler[1], and Kohl and King[2] who solved only the neutral momentum equation, in this paper we have coupled the equations through ion-neutral collision frequency to take into account the feed back interaction between the ions and neutral air equations. The horizontal wind velocities vary with height and time, and are of the order of 200 m.sec^{-1} at about 300 km during night and about 120 m.sec^{-1} during day time for medium solar activity. The zonal wind has a small prevailing eastward component in confirmation with the super-rotation of the upper atmosphere discovered by D. G. King-Hele from small changes in the orbital inclination of artificial satellites.

9. A Model F-Layer at Temperate Latitude
H. M. LUMB and C. S. G. K. SETTY, Delhi

The time dependent continuity equations[1,2,3] for four different ionic constituents (O^+, O_2^+, N_2^+, NO^+) together with the equations of motion for ions and neutral particles are solved numerically in the height range of 120 km to 800 km. The calculations takes into account the parameters for the various physical processes experienced by the plasma. A dynamic diffusion model of the neutral atmosphere and a time-dependent ion-flux have been taken. Results are presented for the winter temperate latitude (Delhi Geog. Lat. 28.5°N) ionosphere for low solar activity.

10. Vibrational Spectrum of Dibenzyl Disulphide
R. N. SINGH, Dehra Dun

Vibrational spectrum of Dibenzyle disulphide has been recorded in CCl_4 solution for the first time in the region of 400–4000 cm^{-1} on UR-10 IR Spectrophotometer equiped with KBr, NaCl and LiF Prisms. A tentative assignment of some of the observed bands have been presented assuming D_2h Symmetry.

11. Coupled Hartree-Fock Calculation of static quadrupole polarizabilities for open shell atomic systems
P. K. MUKHERJEE, A. GUPTA and H. ROY, Calcutta

In this paper an attempt has been made to calculate the static quadrupole polarizabilities of the ions of $2p$ open shell using coupled Hartree-Fock (CHF) formalism. Both degenerate and non-degenerate states of the atoms can be treated successfully in this formalism. The ground and valance excited states of the atoms e.g., B, C, N, O and F and few of their ions have been studied. The results obtained for the quadrupole polarizabilities and shielding factors are encouraging.

12. Variation of total collision frequency for electrons in the Ionosphere with altitude
B. RATH, R. MISRA and B. CHAKRAVARTY, Kharagpur

Total collision frequency for electrons has been calculated at different altitudes (from 100 kms to 200 kms) in the Ionosphere. The variations of γ_{eff} are studied both for Diurnal Maximum and Minimum conditions and the results are presented graphically. The calculated values of collision frequency are compared with those given by Al'pert.

13. Investigation of Polarisation effects in electrolytic Cells.

J. P. DAMLE and R. G. EDKIE, Nagpur

Under suitable conditions, an electrolytic cell can act a source of electrons in a selected energy range (SESER) to bring about desired chemical reactions. Present investigations indicate that the Cr(III)-EDTA complexes can be formed by electrode glow process during A.C. electrolysis also.

The complexes can also be formed only when the cell is polarised and a thermal boundary layer is formed near the thiner wire electrode. These polarisation and thermal boundary layer effects can be harnessed for developing oscillatory circuits as well as for obtaining certain metal complexes, without supplying additional dessipative power which results into electrode glow and the consumption of the metal electrode.

14. Chiral Symmetry Breaking and the K-N. σ Term

T. N. TIWARI, Rourkela

The σ term for the kaon-nucleon scattering is calculated using the $(3, \bar{3}) \oplus (\bar{3}, 3) \oplus (8, 8)$ model of Chiral symmetry breaking, proposed recently by Sirlin and Weinstein. Our estimation gives σ_{NN}^{KK} (550 ± 50) Mev, which is in much better agreement with the experimental value $\sigma_{NN}^{KK} = (540 \pm 160)$ Mev than the value estimated by the conventional $(3, \bar{3}) \oplus (\bar{3}, 3)$ model of Gell-Mann, Oakes and Renner.

15. Effect of Non-Uniform Density on the Instability of Plasma Waves in Solar Corona

S. N. PAUL, Nangulpara

Longitudinal plasma waves (density waves) may be unstable during its propagation through solar corona having non-uniform density. The maximum instability is found to occur near the photosphere and at a distance 1.6 times solar radius, but it is minimum at 1.4 solar radius. It has been suggested that the above instability may lead to the heating or expansion of solar corona.

16. Propagation of Atmospheric Radio Noise Via Sporadic—E Layers in the Equatorial Region

B. B. GHOSH, R. C. SAKSENA and V. J. MALHOTRA, New Delhi

Atmospheric radio noise field strengths (ARN-FS) measured at Trivandrum (08°29′N, 76°57′E) in the frequency range, 2.5 to 9.5 MHz have been compared with the frequency distribution of the occurrences of sporadic-E at Trivandrum and Kodaikanal (10°14′N, 77°29′E) using f_0E_s and f_bE_s data. The analysis shows a close association of enhancements of ARN-FS with the maximum occurrences of sporadic-E at certain frequencies. An attempt has been made to explain these peaks of enhancements of ARN-FS, on the basis of theoretical estimates, as due to reflections from blanketing as well as patchy types of sporadic-E at the corresponding frequencies of their maximum occurrences.

CHEMISTRY

1. A New-method of preparation of Organo tin carboxylates

G. Biswas, Darjeeling

Several methods are available for the preparation of Organo tin carboxylates. Such methods generally fail to produced the quantitative yield of the carboxylates. The present paper offers a novel method of preparation of Organo tin esters. The yield being quantitative in most of the cases.

The method consists in stirring of tri phenyl tin hydroxide and tri butyl tin hydroxide with the esters as ethyl formate, ethyl acetate, butyl acetate, ethyl cyano acetate, di ethyl malonate, di ethyl oxalate, ethyl mono chloro acetate, methyl acrylate at room temperature for eight hours.

The compounds are characterised by their melting points, mixed melting points with the known carboxylates and from their analytical and spectral data.

2. The formation of a tetradentate schiff base diperchlorate and its metal derivatives

N. Sadasivan, Poona

A new method is reported for obtaining the tetradentate schiff base, 5, 7, 7, 12, 14, 14-Hexamethyl-1, 4, 8, 11-tetraazacyclotetradeca-4, 11-diene diperchlorate, by the reaction of diamino ethane with pyridine perchlorate and acetone. All evidence indicates that the compound has a fourteen membered cyclic structure indentical to the protonated schiff base obtained by the reaction of $[Fe(en)_3](Clo4)_2$ with acetone. Mass spectral data provide strong support to the postulated cyclic structure. The metal derivatives of the compound have been prepared for Copper(II and Nickel(II). Thermal decomposition study indicates that incorporation of metal ions have decreased the thermal sensitivity of the perachlorate compounds. The mechananism is discoussed for the formation of the cyclic schiff base.

3. Heterocyclic Fungicides

B. Nanda and A. S. Mittra, Cuttack

Various derivatives of 2-pyrazolin-5-ones have been prepared and tested for fungicidal action. All the previous reports of fungicidal pyrazolones had halogen present. In this investigation several nitroso and arylidene derivatives have shown good fungicidal activity against the blast fungus of rice plant.

4. Oxidation of d-glucose by ammonium vanadate in aqueous sulphuric acid medium

H. M. Singh and A. K. Ram, Ranchi

Potentiometric studies on the oxidation of d-glucose by ammonium venedate in aqueous sulphuric acid (1M to 4M) have been made using gold and platinum elec-

trodes.   An atmosphere of carbon dioxide was maintained in the reaction vessels.   The electron abstraction stages are generally shown by inflexions with the proper choice of an electrode, storage conditions, temperature (including duration of heating) and concentration of sulphuric acid.   The response of gold electrode is better than platinum. Vanadium (V) has been reduced to vanadium (IV).   The oxidation proceeds through free-radical intermediates as indicated by polymerisation experiments.   Inflexions corresponded to gluconic acid, saccharic acid, oxalic acid and formic acid stages.   Some of them were isolated even.

5.   Electron Spin Resonance Spectra of Inorganic Free Radicals Generated in Inorganic Redox Systems, Detected in the Presence of Transition Metal Ions as ESR Indicators

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Interaction of free radicals, formed in Ce^{4+}–H_2O_2 and Fe^{2+}–H_2O_2 systems with transition metal ions, such as, ZrO^{2+}, Th^{4+}, UO_2^{2+} and HfO^{2+}, generated electron spin resonance spectra similar to that generated when Ti^{4+} ions were added to these systems. With the exception of HfO^{2+} ions the ESR spectra generated were narrow symmetrical lines, about 1–2 G wide, with g-values slightly greater than the g-value for a free electron.   The g-value increased, as the atomic number of the metal increased.   When HfO^{2+} ions were added to these systems a two-line ESR spectrum was recorded.   From these data and negative results with other metal ions, it would appear that only metal ions with empty t_{2g} orbitals formed complexes with the free radical species in oxidation-reduction systems to generate the characteristic esr spectra reported.