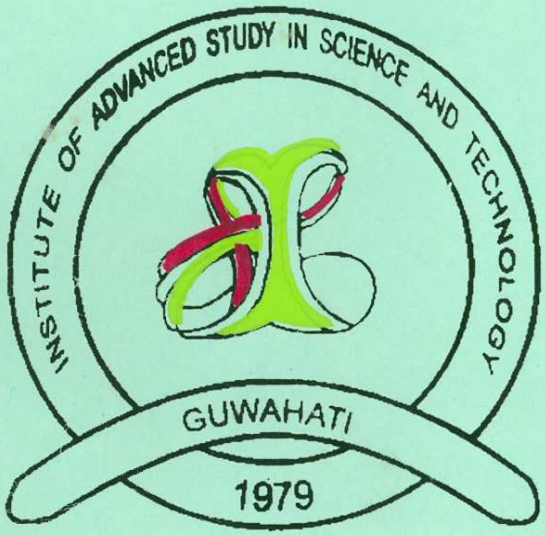
ANNUAL REPORT

(APRIL 1998 - MARCH 1999)



INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

KHANAPARA, GUWAHATI - 781 022

ASSAM (INDIA)

ANNUAL REPORT

(APRIL 1998 - MARCH 1999)

INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

KHANAPARA, GUWAHATI - 781 022

Foreword

It is a pleasure for me to write a few words on the activities of this Institute.

Prof. V.S.Ramamurthy, Secretary DST, Govt. of India visited this Institute and was kind enough to approve the project "Upgrading the IASST". The project includes grants for buildings, manpower, equipments, books & journals etc. We are also thankful to the DSTE, Govt. of Assam for taking initiative in submitting the project proposal.

We are thankful to the DST, Govt. of India, Department of Biotechnology, Ministry of Forest & Environment, Govt. of India and ASTEC, Govt. of Assam for supporting various ongoing projects.

I wish to thank the academic, Scientific and Administrative Staff of this Institute for help and Co-operation.

Prof. K.C. Barua
Director

UPGRADING THE INSTITUTE OF ADVANCED STUDY IN SCIENCE & TECHNOLOGY : GUWAHATI.

The Department of Science & Technology (DST) Govt. of India has sanctioned a major project titled "Upgrading the Institute of Science & Technology, Guwahati" in March'99. The major objectives of the project are to build up a Research Centre with facilities for fundamental and advanced studies in different selected fields of pure and applied science, to promote original/applied and interdisciplinary investigations, to undertake projects in the selected fields in Science & Technology, including projects concerning the develpment and utilisation of resources of the North Eastern Region, to establish and maintain a research and reference library, to establish and maintain sophisticated instrumentation facilities, primarily to cater the needs of the Institute and other relevant scientific activites.

The total grant sanctioned is Rs.9.55 crore, and the grant is to be utilized during the financial year 1999-2002. The major component of grant includes, Building components (Rs.6.50 crore), Equipments (Rs.1.28 crore) and Books and Journals (Rs.0.60 crore). etc.

MEMBERS OF THE COUNCIL 1998 APRIL - 1999 MARCH

1.	Dr. N.K.Choudhury, Former Vice - Chancellor, Guwahati University, Rukminigaon, Guwahati.	Chairman
2.	Prof. B.K.Tamuli, Former Professor and Head, Deptt. of Mathematics, G.U., Gotanagar, Maligaon, Guwahati.	Member
3.	Dr. J. Medhi, Emeritus Professor, G.U., Silpukhuri, Guwahati - 3.	-do-
4.	Dr. K.C.Barua, Director, IASST, Khanapara, Guwahati - 22.	-do-
5.	The Director, Regional Research Laboratory, Jorhat.	-do-
6.	Dr. B.P.Chetia, Professor, Deptt. of Mathematics, G.U., Guwahati.	-do-
7.	Dr. D.K.Sarma, General Secretary, Assam Science Society, Latasil, Guwahati.	-do-
8.	Dr. K.Pathak, President, Assam Science Society, Latasil, Guwahati.	-do-
9.	Dr. Barindra Kumar Sarma, Reader, Deptt. of Physics, G.U. Guwahati.	-do-
10.	The Secretary, Deptt. of Education, Govt. of Assam, Dispur, Guwahati	-do-

11.	The Secretary, Deptt. of Science, Technology & Environment Dispur, Guwahati.	-do-
12.	The Director, Technical Education, Assam Kahilipara, Guwahati.	-do-
13.	The Director, Ministry of Science & Technology DST., Govt. of India, Technology Bhavan, New Mehrauli Road New Delhi - 110 016	-do-
14.	Prof. P. Sen, Saha Institute of Nuclear Physics, Bidhan Nagar, Calcutta - 700 004	-do-
15.	Dr. K.C. Deka, Director, ASTEC., Silpukhuri, Guwahati.	-do-
16.	Dr. N.N. Dass, Professor, Deptt. of Chemistry, Dibrugarh University, Dibrugrah - 786 004	-do-
17.	Dr. G. Barua, Prof. & Head C.S.E. I.I.T. Guwahati, Guwahati - 781 001	-do-
18.	Dr. Joyanti Chutia, Associate Professor, PLasma Physics Division, IASST.	-do-
19.	Dr. P. Azad, Asstt. Professor, Life Science Division, IASST.	Member
20.	Dr. M.K. Kalita, Registrar (i/c) IASST, Khanapara	Non-Member Secretary

STAFF

Dirctor : **Prof. K.C. Barua**

PLASMA PHYSICS DIVISION

Academic Staff

1.	Dr. Joyanti Chutia	:	Associate Professor
2.	Dr. G.C. Das	:	Associate Professor
3.	Dr. C.B. Dwivedi	:	Assistant Professor
4.	Dr. H. Bailung	:	Assistant Professor

Scientific Staff

1.	Sri Arun Kr. Sarma	:	Research Associate (under project)
2.	Dr. ABR Hazarka	:	Research Associate (under project)

Technical Staff

1.	Amal Kalita	:	Technical Assistant (under project)
2.	Sri K.K. Swargiyari	:	Mechanic

Maintenance Staff

1.	Sri Kabindra Deka	:	Laboratory Attendent
2.	Sri Bipul Das	:	Messenger

Research Scholars

1.	Sri Ram Prakash Lavania	:	JRF
2.	Ms Barnali Sinha	:	JRF
3.	Utpal Deka	:	JRF
4.	Sri Jnanjyoti Sarma	:	Part time
5.	Ms. Madhuri Talukdar	:	Part time
6.	Sri Santanu Baishya	:	Part time

LIFE SCIENCE DIVISION

Academic Staff

1.	Dr. J.N. Talukdar	:	Honorary Professor (P.I.)
2.	Dr. P. Azad	:	Assistant Professor
3.	Dr. J. Kotoky	:	Assistant Professor
4.	Dr. (Mrs.) Depali Devi	:	Assistant Professor

Scientific Staff

1.	Mrs. R.L. Devi	:	Senior Research Assistant

2.	Mrs. J. Bordoloi	:	Laboratory Assistant
3.	Sri S. Goswami	:	Laboratory Assistant
4.	Sri J. Deka	:	Research Assistant (under project)

Tecnical Staff

1.	Sri P. Das	:	Senior Technical Assistant

Maintenance Staff

1.	Sri G. Gupta	:	Laboratory Attendent
2.	Sri T. Talukdar	:	Laboratory Attendent
3.	Sri B. Das	:	Field Helper
4.	Ms. M. Pathak	:	Animal Keeper

Research Scholoar

1.	Md. S. Talukdar	:	JRF
2.	Sri R. Saikia	:	JRF

MATHEMATICAL SCIENCES DIVISION

Academic Staff

*1.	Professor J. Medhi	:	Honorary Professor
2.	Dr. B.C. Tripathi	:	Associate Professor
3.	Dr. (Mrs.) M.R. Agrawal	:	Associate Professor
4.	Dr. G. Choudhury	:	Associate Professor
*5.	Sri D.N. Das	:	Chief Statistician

Maintenance Staff

1.	Sri Ratul Baishya	:	Messenger
2.	Sri S. Dey	:	Investigator
3.	Sri S. Baishya	:	Messenger

Research Scholars

1.	Smt. Barnali Dutta	:	JRF
2.	Smt. Sangeeta Kalita	:	JRF
3.	Smt. Mousumi Sen	:	JRF

RESOURCES MANAGEMENT & ENVIRONMENT DIVISION

Academic Staff

1.	Dr. S. Deka	:	Assistant Professor

Scientific Staff

1.	Smt. Arundhuti Devi	:	Sr. Research Assistant

Maintenance Staff

1.	Sri Madan Kalita	:	Lab. Attendent

Research Scholars

1.	Sri P. Sarma	:	Part time scholar
2.	Sri U. Medhi	:	Part time scholar

COMPUTER SCIENCE DIVISION

Academic Staff

1.	Sri A. Barman	:	Assistant Professor
2.	Sri B. Bora	:	Assistant Professor(on extra-ordinary leave)
3.	Smt. L.B. Mahanta	:	Assistant Professor

Technical Staff

1.	Sri N. Bhagabaty	:	Sr. Instructor
2.	Ms. M. Talukdar	:	Instructor
3.	Sri B. Bhuyan	:	Instructor (on leave for higher studies)
4.	Sri M. Singh	:	Console Operator

Administrative & Maintenance Staff

1.	Mrs. S. Bora	:	LDA
2.	Sri N. Goswami	:	Messenger

ADMINISTRATIVE STAFF

1.	Dr. M.K. Kalita	:	Administrative Officer
2.	Sri G.C. Bhuyan	:	Finance & Accounts Officer
3.	Sri R. Sarma	:	Public Relation Officer
4.	Sri P.K. Deka	:	UDA
5.	Sri S. Sarma	:	Accountant
6.	Sri R. Mahanta	:	Jr. Accountant
7.	Sri R. Kalita	:	LDA
8.	Sri D. Deka	:	LDA
9.	Sri P. Barman	:	LDA
10.	Sri D. Das	:	Stenographer
11.	Sri T.D. Goswami	:	Assistant Librarian
12.	Sri T.D. Baishya	:	Library Assistant

Maintenance Staff

1.	Sri N. Hazan	:	Driver
2.	Sri U.C. Deka	:	Messanger
3.	Sri B.C. Deka	:	Messanger
4.	Sri B. Choudhury	:	Messanger
5.	Sri S. Das	:	Day Chowkidar
6.	Sri L.K. Saud	:	Night Chowkidar
7.	Sri B. Pathak	:	Chowkidar (land)
8.	Sri M. Kalita	:	Electric Jugali cum Lab Helper
9.	Smt. M. Das	:	Cleaner
10.	Sri. H. Medhi	:	Night Chowkidar
11.	Sri M. Bosfor	:	Sweeper

Research & Development Activities

PLASMA PHYSICS DIVISION

EXPERIMENTAL :

(a) Sheath Phenomena in Multicomponent Plasma.

Ion dynamics in the sheath in multicomponent plasma with negative ions show the existence of a hump in the potential profile near the sheath edge. The characteristics of the hump depend on the grid voltage of the dp device, energy of the beam and the density difference in the two chambers of the device. An ion resonance which is coupled with beam and background ions are associated in the excitation mechanism of these oscillations and to create an asymmetrical structure in the potential profile. Thus the variation is caused solely in the ion-rich sheath potential by the ion dynamics which is modified correspondingly by increasing the ration of negative to positive ion concentration. When this ratio is smaller than a critical value, then the momentum gained by the negative ions seems to be greater by the coulomb collision than the momentum gained by electrostatic force. Above the critical value, the electrostatic force predominates and the behaviour is opposite in character.

(b) Low frequency mode in Multicomponent Plasma.

The existence of slow mode with low frequency has been observed experimentally in multicomponent plasmas with negative ions. Based on linear perturbation theory a dispersion relation for low frequency electrostatic wave has been derived. The experimental observations on low frequency electrostatic wave yield the quantitative frequency variations due to the presence of the negative ions. In the region of lower negative ion concentration, the mode decreases with the addition of more percentage of negative ion concentration, the variation shows the asymmetric behaviour with negative ion concentration. Both the observations, theoretical and experimental have shown a good agrement with each other. Moreover, a theoretical model of plasma with heavy negative ions has also been presented.

Report of the research work done (during April'98 - Feb'99) by Dr. H.Bailung at the Institute of Space and Astronautical Science, Japan in collaboration with Prof. Y.Nakamura under BOYSCAST fellowship programme awarded by DST, Govt. of India.

(c) Dusty Plasma :

A novel dusty plasma device has been designed and coinstructed which is capable of producing a large volume homogenous unmagnetised dusty plasma with controlable dust density. The device is first of its kind and found useful for study of basic dusty plasma parameters as well as the wave propagation through dusty plasma. The device is essentially a double plasma device where a dust dispersing apparatus consists of an ultrasonic vibrator and a dust reservoir is suitably mounted. When the ultrasonic vibrator is tuned (at frequency 24.5 kHz) dust grains fall uniformily through the fine mesh fitted at the lower end of the dust reservoir. Dust density is measured from the extincted itensity of a light when

allowed to pass through the dusty plasma column and collected by a photo diode. The typical operating Ar plasma parameters are : plasma density 10^8~10^9 cm^{-3}, electron temperature 1 ~ 2 eV and ion temparature 0.1 eV. Dust grains are uniformaly sprayed over the target plasma with a control of density in the range 10^3 ~ 10^5 cm^{-3}. The dominant charging machanism under this condition is the accumulation of electrons and ions on the surface of the dust grains. In case of isolated dust grains, the situation is very much similar to the floating langmui probe in a plasma and therefore, the charge on the dust grains is related to the surface potential of the dust grain. In case of dense dusty plasma (when intergrain distance is much smaller than the dust size), however the average charge on the dust grain reduces.

The modification of ion-acoustic wave propagation in a dusty plasma has been studied by measuring the linear dispersion relation of ion-acoustic wave when the plasma contains the charged dust grains. We observed reasonable increase in the wavelength of the wave pattern when the dusty density is increased. The wave also suffers heavy damping with increasing dust density and the damping is found proportional to the iondust collision frequency. A general dispersion relation for the ion-acoustic wave which includes the effect of charged dust in the plasma is used to compare the experimental findings.

(d) Solitary Waves :

The resonance interaction of two obliquely propagated ion-acoustic solitons in two dimensional space has been studied experimentally in a plasma containing additional negative ion species. The K-dV equation derives for such a plasma predicts compressive solitons when negative ion concentration 'r' is below a critical value 'r_c' and rarefactive solitons results when 'r'>'r_c'. The experimental investigation reveals that in the case of oblique collision of compressive solitions, the resonance amplitude increases when the colliding angle is fixed. When the negative ion concentration is larger than the critical value, the rarefactive ion acoustic undergo as resonance interaction for lower resonance amplitude. The predictions of K-dV equation where the conditions for three wave interaction are incorporeted are found to agree well with the experimental results.

Report of the research work done (during Feb.-May ' 99) by Mr. Ram Prashad at IPR.

Spetroscopic measurement of Plasma density and temparature in a HVAIC Torch.

Spectroscopic methods have been used to characterize the plasma produced by a torch (Hollow Vertical Anode Inclined Cathode Torch) for melting silica and other ceramic. The plasma was produced between the graphite anode and inclined cathode. This produces two separete cathode and anode plasma columns, linked at the surface of the feed material fused silica in this case. The arc region is extremely hot and emits the radiation in the visible and UV region. By fine optical arrangement the optical signal is sent to the Optical Multi-channel Analyser (OMA) with spectral resolution ~$2A^0$ (for ICCD) and ~ $0.2A_0$ (PMT at 10 um slit width). The prformance of the arc has been studied over the range of 70 to 140 Amp discharge current and N_2 gas flow rates at the electrode region from 0 to 20 liter/min. At cathode line emission from singly ionized Nitrogen (NII) was observed while line emission from neutral Nitrogen (NI) was observed at lower discharge current but no emission was observed from nitrogen molecular band. In the region above the melt on the anode side of the arc features corresponding to the well known

band of CN redical was also observed. Very little instrinsic hydrogen lines could be detected and to make use of stark broadening lines of $H_{ß}$ and $H_{œ}$ lines the N_2 gas flow through electrode was bubbled through water. In this spectroscopic study, density of plasma at the anode and cathode tips and just above the molten surface has been measured by using these $H_{ß}$ and $H_{œ}$ lines. The temperature inferred on the assumption of LTE appears to be constant with the observed relative intensities of neutral and ionic lines of nitrogen and continuum radiation. The plasma above the fused silica surface is seems to be the coolest region. A complete density and temperature mapping of the full region would aid in inferring the current flow path in this novel electrode configuration.

THEOREITICAL

(a) Solitary Waves and double layers :

Some observations are made to relate the dynamical behavior of the nonlinear waves in different plasma configurations categorically divided as multicomponent plasma as well as dusty plasma with a view to showing the coexistence of spiky and bursting solitary waves, double layres and various chaotic behaviour in the siolitary waves controlled by the plasma parameters. The group is working on acoustic wave propogation, employing either by reductive perturbation technique or by quasipotential analysis to relate the observations stemming in theoretical plasma model with the laboratory plasma and satellite observations. The non linear wave equation was derived by the augumentation of the Kadomstev Petriashvili (K-P) equation. The evolution of soliton propagation in plasma was also discussed. A new formalism of the modified simple wave solution technique to the non linear wave dynamics has been developed for finding the solution bevaviour in plasma consisting of cold and warm electrons. Because of using the new approach, the K-P wave equatiom has been transferred to an ordinary differential equation which has been solved by the Frobenius methods for finding the non linear behaviour of the soliton propagation.

In sequal to the observations on solition dynamics in plasmas a few more features on soliton and double layers have been studied in a nonisothermal plasmas consisting multi temperature eletrons. By using the quasipotential analysis under certain conditions, the remarkable properties of soliton propagation and double layers of compressive and refractive nature in the plasmas have also been studied.

Our next motivation is to know the soliton dynamics in dusty plasmas to investigate the dust acoustic waves which might be of interest for the future experiments. Employing the quasipotential analysis, the Sagdeev potential equation has been derived in a multicomponent plasma consisting of free and trapped electrons and contaminated by the dust charged grains forming therein by the attachment of electrons to finite size dust particles. Because of the free and trapped electrons in the dusty plasma, the plasma acoustic wave exhibits different features of various solitary waves.

(b) Bohm-chodura sheath :

Sheath criterion has been derived for the magnetized collision sheath. Collision of ionneutral and electron-neutral has been taken into consideration in the present model. Analytical study for one-mode sheath

and two-mode sheath has been done. Child's Law derived for 3-D structure is analyzed by using three scale analysis. The present model gives the idea about the sheath in three different range of magnetic field i.e. intermediate, weak and strong magnatic field. How sheath beaves independently with magnatic field at different angles and with different collision parameter. Monotonic nature of the sheath is shown by using Taylor series expansion to remove the singularities induced with it.

(C) Generalised Sheath Instability :

Sheath instability problem is solved as an Eigen-value problem for quasi-neutral plasma and electron and ions are primarily governed by ambipolar diffusion. The present study is for the positive sheath. The source ionization term is considered to be constant with ionization and degeneracy associated with it. No secondary emission is taken into consideration . In the present study for electron neutral conllision Bohr value for atomic cross section is taken into consideration, ion-neutral collision is taken to be twice the electron-neutral collision. Largest value of mass ratio is 0.0005. Thermal plasma in argon gas at 100 Torr, with ion temparature is 15000K (1.3eV) is considered. Here recobbination scale length is 0.12 mean free path is 0.00086 cm and Debye length is 0.0000044 cm. The ion and electron streaming velocity is approximately - 11.5 V. Dispersion relation is derived and stability analysis has been done. Growth rate is found to be increasing for ionization term and also for thearmal plasma where as it decreases with the collision effect.

(d) Linear and Nonlinear Phenomena in Plasmas.

(i) Sheath

Basically a plasma sheath formation is a dynamical process of field localisation which is carried out by some non-linear plasma wave evolution & saturation mechanisms that produce a localised steady state non neutral space charge region in the vicinity of some interface. This is described by an exact non-linear plasma sheath equation. But at many places in the scientific literatures of non-linear plasma wave dynamics, one can find the nomenclature of "moving plasma sheath" denoting for double layer, solition etc. The soliton, double layer, vortex etc. are the bounded potential structures produced by the weakly non-linear plasma waves which are described by the solutions of standered non linear wave equation with partial non linearity. Whereas, the usual plasma sheath near an interface is a consequence of the full non-linearity in basic governing plasma sheath equations. Could it be possible then to say no static space charged distribution can occur in bulk plasma volume ? This question needs an adequate attention as because the plasma sheath formation is a self-consistent phenomenon near the wall surface of any bounded plasma system in laboratory experiments. The recent observation of coulomb phase transition under micro gravity conditions in bulk plasma volume in space experiments by MIR station may invalidate the above doubt in the case of non-ideal plasmas. However, it is too early to comment anything more than the qualitive assertions.

For the first time, a self-consistent theoritical model {9} has been proposed for describing the stability behaviour of an asymmetric bi-potential plasma sheath. A local linear turbulance model has been developed to identify the unstable low frequency mode driven by the asymetric sheath potential profile. The

model analysis considers the bi-potential palsma sheath as a source of counter stearming ion beams along with non-linearly localised flow structure. The symmetric counter ion streams near the plasma sheath boundaries suffer a qualitative change when bi-potential profile is made asymmetric by introducing a relative potential difference between the plasma sheath edge potentials on both the sides of the bi-potentials space charge sheath. This job is carried out either by external biasing or by change in the internal plasma parameters on both the sides of bi-potential space charge distribution. The model approach provides a satisfactory explanation to the experimental observations regarding the excited eigen mode frequency, excitation mechanism & localiation of the instability near plasma sheath boundary at lower potential side. However, there still remains many relevant questions to be addressed self consistant either within the proposed model or within some improved version of it. For example, the simultaneous existence of stationery (global) & propagotory components demands a query wheather these two have the common source of excitation or different sources with mutual coupling. Why a threshold exists on the sheath amplitude for the onset of the instability for a given critical value of potential asymmetry ? Is there any corelation between, the two ?

All these deliberation require more sophisticated mathematical & numerical formulations to include all possible equilibrium parameters to describe the equilibrium space charge potential sheath profile. The model calculations are in nature & contribute a valuable addition in basic physics of the rich sheath driven low frequency instability.

(ii) Colloidal plasma :

Recent upsurge of the research activities in colloidal has posed a great deal of responsibility to the basic plasma physics to develop a good understanding of the colloidal plasma physics in order to harness the technological fruits of the basic physical principles of the colloidal plasma dynamics. A pioneer work has been carried out to show that in a bounded colloidal plasma under external effect, a three scale plasma structure can exist along the gravity [10]. It is also found that the third scale named as the "intermediate scale" which provides a smooth transition from the free fall scale to the normal Debye sheath scale is likely to be highly turbulent. This scale is governed by quasilevitation condition in a localised region of the plasma sheath boundary. It is argued that the intermediate scale acts as a local potential trap to confine the high dense clouds of charged colloids through flow control of these charged colloids. It is speculated that the trap being sensitive to the plasma wave turbulence may trigger & drive some selective eigen modes [10] . The correlation effect may assist as a sources in non linear driving of the selective plasma eigen mode to produce the wave packets termed as the quasi-particles to act, to provide an electrostatic binding between of coulomb colloids to facilitate the coulomb condensation leading thereby to a process of coulomb phase transition (CPT). This is what we term as the wave Turbulance Model for the CPT.

Some of the basic theoretical understanding about collective colloidal plasma dynamics have been applied to predict the behaviour of star formation mechanism in a dust cloud of an infinitely large extension with a partial dust population ionisation. Such clouds of Jean's size are found to collapse in a pulsational mode [11] at the Jean's scale of the total dust mass fluctuations. The linear gravito-eletrostatic coupling on the Jean's scale of pertubations caused a relative slippage & consequently oscillations in between the

netural and the charged dust fluids. It looks as if the gravitational collapse is superposed with an oscillatory mode on the same space and time scales.

Scientifically meaningful arguments have been advanced to distinguish the colloidal plasma as a distinct class of multi species plasma [12]. The distinction lies between the basic difference in charging mechanism of the coulomb colloids of finite size that of the normal atomic molecular impurity ions. These coulomb colloids or to say the coulomb colloidal particles have been termed as the dust grains impurity (DGLII) ions. This is based on the similarity of their charging model with that of the dust grains. Under statistical formulation of the dust grains charging model, the dust grains charge suffers a periodic fluctuation around some statistical average charge value decided by the floating potential around the dust grain surface . It may be discussed that the average floating potential over the random sequence of electron & ion collection by the dust grain surface can correspond to the static statistical average charge value. Now this static value may not remain constant all the time but fluctuate due to randomness in the electron & ion collection time scales.

Under spherical symmetry of the dust grains, each & every charged dust grains could be assumed to behave as the dust charge oscillator (DCO). These oscillator on collective scale drive the parametric resonance excitation of the acoustic & plasma oscillation modes in colloidal plasmas. This driving mechanism may be used as theoretical principle for colloidal plasma diagnostics and also for the construction of the plasma acoustic amplifier.

The question of soliton formation in colloidal plasma has been revised to highlight that near the continuum limit of the dust grains population density a short scale (highly dispersive) solitary wave is likely to exist on the acoustic time scale of the of the so-called acoustic mode (SCAM). Theoreitical & numerical analysis of the associate K.dV and the exact energy integral equation has been carried out [5] to describe propagation & structural properties of the non linear solitary eigen mode corresponding to the SCAM. These research activities have resulted into following publications:

AWARDS :

1. Dr. Joyanti Chutia received the Durlav Deka Memorial Awards in December 1998 from Assam Science Society.

2. Dr. H. Bailung was awarded Boyscast fellowship by DST, Govt. of India to work in beam diagnoistics in plasma at ISAS, Japan from April,1998 to March 1999.

3. Ph. D. degree was awarded to Mr. Anjan Buragohain by the Guwahati University for his thesis "Study of Chaotic instabilities in Ion Beam Plasma System" under the guidance of Dr. Joyanti Chutia in May 1998.

"A" School on PLasma Physics" was held during 20th - 30th April 1998 and it was very much

successful 15 participants from different Institutes and states of north eastern region and 8 resource persons from national Institute like IPR, SINP, BARK, CAT were invited to deliver talks on some basic topics of plasma and diagnostics. There were fruitful ineractions among the participants and the resources persons.

Invited Lecture Series :

(A) Prof. R.K. Verma, Physical Research Laboratory, Ahmedabad delivered two talks on 4th and 5th March 1999.

(i) "Instabilities of inhomogeneous Plasmas Steaming relative to the dust".
(ii) Anomalous Particle Transport in Tokamaks.

(B) Prof. M.P. Srivastava, Delhi University, Delhi delivered the following lectures during 3rd week of March'99.

(i) Plasma and its horizon
(ii) KInetic Theory of Plasmas (I)
(iii) Kinetic Theory of PLasmas (II)
(iv) Waves in PLasma (I)
(v) Waves in Plasma (II)

Invited Talks :

1. Dr. C.B. Dwivedi delivered an invited talk in a scientific discussion meeting organised by Prof. R.K. Thareja (IIT, Kanpur) on Laser-Matter interaction using short pulsed laser (Nov. 14-15, 1998). Topic "Coulomb phase transition & possibility of novel plasma material".

2. Dr. C.B. Dwivedi delivered an invited talk in a national "Meeting on Current Trends in Plasma Physics" organised by Prof. D.P. Dewangan (PRL, Ahmedabad) during feb. 9-10, 1999 in favour of Prof. A.C. Das (PRL) on his 60th Birthday. Topic "The role of neutral dynamics generation mechanism of mesospheric plasma irregularities".

Visit to Other Institute :

(1) Arun Sarma, RA visited the FCIPT, IRP at Ahmedabad for three months with effect from July 1998 to undergo training in plasma Processing.

(2) Ram Prakash Lavania, JRF was awarded PSSI fellowship for three months with effect from February'99 to work in Optical Emission Spectroscopy at IPR, Ahmedabad.
(3) Dr. G.C. Das visited the Physics and applied Mathematics unit of Indian Statistical Institute, Calcutta

for collborative research work with plasma physics group in physics and applied Mathematicsunit for solitary waves in plasma and dusty plasma. Inthis visit Dr, Das and his research scholar Mr. J. Sarma collaborated two research problems with plasma physics group.

(4) Dr. Das delivered the following lectures :

(i) Dynamics of formation of solitary waves in multicomponents plasma in relation to space plasma (lecture I, ISI, Calcutta) June 1998.

(ii) Whistler as a diagonostic phenomena in the lower ionospheric region,..... (Lecture II, ISI, Calcutta) June 1998.

(iii) Basic concept of solition formation and propagation in plasma Special invited lecture at department of Mathematics (Guwahati University) 1998.

(5) Dr. G.C. Das delivered the following talks in the refresher's course arranged by the Math. Deptt. at Guwahati University during August 1998.

(i) Advanced numerical methods.

(ii) Basic computer oriented numerical techniques.

(iii) Introduction to FORTRAN language and its application.

(iv) Application of numerical methods in plasma physics.

(6) Dr. G.C. Das delivered two talks at school on plasma Physics held at Plasma Physics Division April'98 IASSt, Khnapara, Guwahati - 781 022 . Assam.

(i) Basic properties of Plasmas.

(ii) Various phenomena of plasma waves and its application to the lower ionosphere.

(7) Dr. C.B. Dwivedi visited PRL, IPR and IIG (Mumbai) for about a month in Feb.-March, 1999 for Ltterature survey and the ongoing collaborativeinteractions on the inter institutional basis.

Participation In National And International Conferences :

(1) Dr. Joyanti Chutia attended the International conferance in Frontiers of Physics at Malaysia and presented the paper "Ion dynamics in the sheath of Multicomponent Plasmas".

(2) Dr H. Bailung attended second International Conference on the Physics of Dusty Plasmas held in Hakone, Japan, During May 24-28, 1999.

(3) Dr. C.B. Dwivedi participated in XIII National Symposium on Plasma Science and technology organised by Deptt. Of Physics, Saurastra University, Rajkot (October 27-30, 1998)Research paper were presented in oral and poster mode of scientific communication. These were published in abstract forms.

Papers published in International / National Journals :

1. Das G.C. and Sarma J. "Evolution of solitary waves in multicomponents plasma" Chaos, solition and Fractals 901, Vol. 5. 1998.

2. Das. G. C. , Sarma J. and Talukdar M. "Dynamical aspects of various solitary waves and double layers in dusty plasma, physics of plasma, 63,Vol.5,1998.

3. Das. G. C. , Sarma J. and Talukdar M. "Non linear ion-acoustic solitary wave and double layers in multicomponents plasma, Contrib. To plasma physics, 599, Vol.38, 1998.

4. Das G.C. and Sarma J. "A new mathematical approach for finding the solitary waves in dusty plasma,physics of plasma,3918,Vol.5,1998.

5. Baishya S.K., Chutia J., Kalita M.K., Das G.C. and DWivedi C.B. "Possibiity of weakly charged nonlinear solitary dust cloud near the continuum threshold of dust population in a quasineutral dusty plasma. Pramana 757, Vol,51, 1998.

6. Handique B., Bailung H., Das G.C. and Joyanti Chutia " Observation of low frequency mode in Multicomponent Plasma with netative ions" Phys. of Plasas,1636,Vol.6no5 (1999).

7. Bailung H., Nakamura Y. "Oblique collosion of plane ion-Acoustic Solition in Multicomponent Plasma." J. Plasma Phys.151,Vol,61part1(1999).

8. Nakamura Y. and Bailung H."A Dusty Plasma Device" Rev.Sci Intrum.2345,Vol,70,no5 (1999).

9. Kabita Rani Rajkhowa, C.B. Dwidedi and S. Bujarbarua, "Stability analysis of a model equilibrium for a gravito-eletriststic sheath in a colloidal plasma under external gravity effect", Pramana - Phys.52,293.(1999).

10. C.B. Dwivedi, A.K. Sen and S. Bujarbarua "Pulsation mode of gravitational collapse and its impect on the star formation", Astrophys, & Astronomy 345 1049,(1999).

11. C.B. Dwvedi "Discrete charging model and parametric excitation of the socalled acoustic mode in dusty plasmas", Phys. of Plasmas,6.31(1999)

CONFERENCE PAPERS & ABSTRACTS :

1. Ram Prakash, A. Sarma, J. Chutia "Ion Dynamics in the Sheath in Multicomponent Plasma". International Meeting on Frontiers of Physics Malaysia, October 1998.

2. A. Sarma, S. Mukherjee and P.I. John "Plasma Production by Constrictd Anode" XIII PSSI, December 1998. (Saurashtra Univ. Rajkot)

3. Das G.C., Sinha B. and Chutia J. "Characteristics behaviour of shesth formation in a multicomponent plasma with various warm ionic species" Plasma 98 (Saurashtra Univ. Rajkot)
4. Das G.C. and Talukdar M. "Formation and propagation of ion-acoustic solition in magnetized multicomponent plasma". Plasma 98 (Saurastra Univ. Rajkot)

5. Das G.C. and Sarma J. "Dynamical behaviour of the formation and propogation of solition in magnetized multicomponent plasma" Plasma-98 (Saurastra Univ. Rajkot).

6. Das G.C., Singha B. and Chutia J. "Characteristics behaviour of sheath formation in thermal plasma" Plasma -98 (Saurastra Univ. Rajkot)

7. A.B.R. Hazarika "Rayleight-Taylor Stabilization of Velocity Shear in Low Frequency Fluctuations "Plasma-98,and also in "NCTP" 99.

8. A.B.R. Hazarika "Rayletgh-Taylor Stabilization of Velocity Shear in Low Frequency Fluctuations "Plasma-98, and also in "NCTP",99.

9. Kelvin-Hemholtz Instability of a Rotating Managetized Plasma with Polytropic Pressuer Law.39th Technical Session Assam Science Society, 1998.

MATHEMETICAL SCIENCE DIVISION

A.K. Agrawal Studied some interesting combinatorial properties and q-analogue of the Lucas nember and hypergcemetric form an integral representation of Lucas sequence. Knath's correspondance have been defined and Mac Mohon's definition of compositions has been extended to n-colour compositions. M.R. Agrawal is working on the problem of constructions of finite universal Korovkin sets for the commutative Banach algebra of radial functions. G.Choudhury is working on developing single as well as batch arival amount of time, which is called as set up time to begin each busy period. B.C. Tripathy introduces the concept of uniformaly balanced sequence spaces and studied the uniformly balancedness of the domains of the diagonal matrix maps. He studied the solidity of the domains of the diagonal matrix maps and characterized some matrix classes.

New Observations :

A.K. Agarwal obtained the period's properties os Lucas number. The recurrence relations, summation formula and combinatorial representation for the q-analogue of Catalam number are studied. G. Choudhury etablished that the deparature point queue size distribution can be decomposed into the distributions of three independent random varibles. M.R. Agarwal constructed finite Universal Korovkin sets for the commutative Banach algebra of radial functions. She observed a connection between algebraic properties of a [z] group and the topological properties of G^ (the set of all equivalence classes of continuous irreducible unitary representations. B.C. Tripathy observed the difference between uniformly balanced sequence spaces and solid sequence spaces.

Innovations :

Introduction of q-analogue of Catalam numbers. Concept of vacation period (i.e. the period for which the system is idle) is introduced for the first time for the models in queueing theory. Introduced the concept of uniformly balanced sequence spaces.

Application Potential :

Application of n-color composition in number theory and combinatories. The results obtained in Harmonic Analysis answers the question asked by M. Pannenderg in 1989, in the context of the centre of Beurling algebra. In queueing theory the models will be applicable in various schedulimg problems. The work done in the theory of summability will find relationship with functional analysis and topology.

Manpower Cell :

This cell of the IASST is devoted to undertaking studies primarily relating to science & Technology Manpower Information for the N.E. Region. The D.S.T. sponsored projects in hand, viz "A study on utilisation and Career Profile of Ph.D.s and P.G.s in Science and technology and the extent of R&D activities undertaken by the Ph.Ds. in higher educational Institutions in the north eastern states", was

completed during the year. The report of the study was finalised by April 1998. The printing of the report took some time and ultimately the report of the study was submitted to the D.S.T. Govt. of India on 15th July'98.

ACHIEVEMENTS & AWARDS :

1. Dr. B.C. Tripathy reffered two research articles for referred periodical.

2. Dr. G. Choudhury referred two research articles for referred periodicals.

3. Dr. B.C. Tripathy Delivered an invited talk entitled "On Convergence Preserving matrix maps" on15th October,1998 at IIT Guwahati.

4. Dr. G. Choudhury delivered an invited talk entitled "The development of Markovian queues" on Dec.01, 1998 at IIT Guwahati.

5. Dr. G. Choudhury delivered an invited talk entitled entitled "Utilization of the idle time on M/M/1 queueing system with an exponential set up under N-Policy" on4th Jan, 1999, at ISI New Delhi.

6. Dr. B.C. Tripathi delivered an invited talk entitled "Sequence spaces in between convergent sequences and devergent sequences" on Maech 25, 1999, at Cotton College, Guwahati.

VISIT OF ACADEMIC AND OTHER STAFF MEMBERS TO OTHER INSTITUTES :

1. Dr. G. Choudhury visited statistical Quality Control & Operation Research Division, Indian Statistical Institute, Delhi from Dec. 22, 1998 to Jan.9, 1999.

VISITORS

1. Porf. S. Pattanayak, Department of Mathematics, Sambalpur Univrsity, Orissa, visited the division and delivered a talk on "Wiener-Hofman Integeal Equations" on July 13, 1998.

2. Prof. H.D. Mac Person of Leeds University, U.K. visited division and delivered a talk entitled "Random Graphs" on Feb.23,1999.

3. Prof. Nanda Kisore of Berhampur University (Retd.) visited the division as visiting professor during March 15-28, 1999 and delivered 5 lectures in the division and had discussions with members of the division.

RESEARCH PUBLICATION :

1. Agrawal M.R. & Tewari U.B. : A Characterization of a class of [z] group via Korovkin Theory, Rend. Circ. Mat. Palermo 48 (1998)123-134 (Italy).

2. Tripathy B.C. : On statistical convegence, Proc. Estonian Acad. Sci. Phys. Math.(1998)47(4)299-303 (Estonian)

3. Tripathy B.C. : On statistically convergent sequences, Bull. Calcutta Math. Soc.90(4) (1998) 259-262. (India)

4. Tripathy B.C. : Matric maps on the power-series convergent on the unit disc, Jour. Analysis 6 (1998),27-31, (India).

5. Tripathy B.C. : Matrix transformations between series and sequences, bull. Malaysians Math. Soc.21 (1998) 17-20 (Malaysia).

6. Choudhury G. : The steady state selection of a general class of central operating policy in the M/G/1 queue involving random setup time : An analytical approach, Stochastic Modelling & Appl.1 (1998), 60-71 (India)

7. Choudhury G. : On a batch arrival poisson queue with a random setup time and vacation period, Computers & Operations Research 25 (12) (1998),1013-1026 (U.S.A.).

8. Choudhury G. : Some result of $M^x/M/1$ queue with general vacation, Bull, Guwahati Univ. Math Assoc. 4(1998), 9-14. (India).

9. Chudhury G. & Borthakur A. : Further results on the distribution of busy and idle period in a Poisson queue under general bulk service rule. J. Assam Sci. Soc. 39(3) (1998), 124-131. (India)

10. Das K.K., Nath D.C. & Nandi S.B. : A probability model estimating the risk of out-migration for rural areas of Uttar Pradesh, India, Guwahati Univ.Jour. of Sci. Golden Jublies Volume (1998),81-88 (India).

CONFEREMAC PAPERS AND ABSTRACTS :

1. Dr. M.R. Agrawal : "On a problem of Korovkin Approximation Theory", presented in the International Conference on p-Adic Anaklysis, Summability Theory, Fuzzy Analysis And Applications, held at Chennai Dec. 21-24, 1998. (Abstract,p.15).

2. Dr. B.C. Tripathy, Ms. B. Dutta & M. Sen : "On uniformly balanced sequences and Matrix Maps" ; presented in the technical Session of Assam Science Society, Dec.19,1998. (Abstract,PA-6).

3. Dr. B.C. Tripathy, Ms. M.Sen & Ms. B. Dutta : "On second proofs of some existing results", presented in the technical session of Assam Science Society. Dec. 19,1998 (Abstract,P.A.18).

4. Dr. G. Choudhury & Ms. S. Kalita "Some results of a bulk service queue with finite waiting space", Presented in the International Conferences on Operational Research and Better Tomorrow, New Delhi, Dec.24-26, 1998. (Abstract,p-62).

5. Dr. G. Choudhury, S. Kalita & Prof. A. Borthakur : "Some aspects of N-policy queueing system of type $M^x/G/1$ with generalised vacation : A review based on some recent development", presented in the Technical session of Assam Science Society. Dec.19.1998. (Abstract,p. A-3).

6. Dr. G. Choudhury : "Some aspects of batch arrival poisson queue with a random setup time and generalised vacation", presented in the Intrnational Conference on Operational Research and Better Tomorrow : New Delhi, Dec. 24-26, 1998. (Abstract,p.61.)

7. Dr. G. Choudhury & Prof. A. Borthakur : "A huristic approach to an M/G/1 queue with a single vacation under a threshold schedule" presented in the International Conferances on Operational Research and Better Tomorrow, New Delhi, Dec. 24-26, 1998 (Abstract,p-33)

8. Dr. B.C. Tripathy : "On solid spaces and summability", presented in the International Conference on p-Adic Analysis, sumability theory, Fuzzy Analysis and Applications, Chennai, Dec.21-24, 1998. (Abstract,p-22)

9. Dr. B.C. Tripathy : "On sequence spaces and density of subjects of natural numbers", presented in the 14th Annual Conference of Banaras Hindu Mathematical Society, Nov. 30, Dec 1, 1998, Varanasi, (Abstract, p.4).

11. RESOURCE MANAGEMENT AND ENVIRONMENT DIVISION :

The Resource Management and Environment Division (RM&ED) has been carrying out research on following subjects :

1) Management of refinary studies :

Oily sludge is the waste of refineries. It may generated by sedimentation process in the bottom of crude and heavy black oil storage tank, in sludge separator unit and in biological effluent treatment plant small amount of sludge may be generated in various unit process in a refineries.

Guwahati refinery situated at Noonmati, Assam has genarated 2560 m^3 sludge per year. These slidges are disposed off in land adjacent to the refinery. Disposal of sludge generated by the refinery was not a problem in the early part of its eatablishment, as space was available during that time. At present, due to limitation of space, disposal of refinery sludge has becoming a serious problem of environmental degradation, even it may contaminate the ground water resources in near by areas by leaches from the disposal site (NEERI,s report). Keeping this into consideration, the RM&ED has undertaken the following investigation.

Management of refinery sludges for agricultural crop production .

The investigation on this topic is on progress. The investigation reveals that all the sludges contain 15-38% oil (weight%) which could not be extract despite various operations at the refinery. The sludge is also rich in ash content and a number of minerals. The large oil content of the sludge is a limiting factor on biodegradability of the sludge. It is likely that the oil remaining in the sludge is composed mainly of heavy hydrocarbon fragments which are normally resistant to degradation.

II) Management of Paper Mill waste :

The Hindustan Paper Corporation (HPC) located at Jagiroad, Morigaon destrict in central Assam generated large quantities of solid and liquid waste. It is reported that the paper mill has priduced 940 ton solid waste per day (NEERI,s report). Lime sludge and ash constitute the main bulk of solid wastes. The solid waste of the mill are discharged to a nearby area. It creates not only the problem for disposal but also creating a problem of environment pollution.

The physico-chemical characterization viz. p^H, conductivity, water holding capacity, organic carbons, nitrogen, sodium, potassium, lead, mercury, copper, zinc, nickel etc. have been studied. It was also revealed from the investigation that these parameters had changed the quality of the soil as a result of which up to 20% of this sludge mixed soil had shown a good response for general welfare of the crops.

ABSTRACTS :

1. Concentration of heavy metals in drinking water near Guwahati refinery P. Sarma, A. Devi and S. Deka. Abstr. Assam Sci. Soc.C-7. (1998)

2. Distributional pattern of blue green algae in rice field soils of Nagaon sub-division, Nagaon in the state of Assam. S.U. Ahmed, M.C. Kalita, S.Deka, S. Hazarika and B. Medhi. Abstr. Assam Sci. Sco. B-I (1998)

3. Screening of carrier materials for production of Rhizobium. S. Deka and C.K. Baruah. Abstr. regional Conf. On Biofert.P.31. (1999).

4. Nitrogen fixing potential of Cynobacteria isolated from rice field solis of nagaon sub-division, Nagaon, in the state of Assam (India. S.U. Ahmed, M.C. Kalita, S. Deka, S. Hazarika and B. Medhi. Abstr. North. East. Reg. Conf. On Biofer. P.39. (1999).

LIFE SCIENCES DIVISION :

1) Biochemistry Section :

Plant based remedies are frequently considered to be less toxic and free from side effects. There is great interest in identifying new sources of plants-based remedies for human ailments.

The population of North East Region consists of various ethnic group with different cultures. The indigenous people of this region are still using plant-based remedies for curing aliments amongst their communities. These people do not rely on the modern therapies available in the market. Surprisingly, these remedies (though not all) give comfort, and relief from the sufferings and even cure some of the diseases permanently where the modern allopathic system failed to do so. However, some of the valuable practices and knowledges are vanishing very fast from the society due to many reasons.

A survey in some rural and tribal areas in selected parts of Kamrup district to identify such practices prevalent amongst the people. We have documented the names of such practitioners and their practices for future reference and record and have made an effort to establish a DATA base of such valuable knowledge. After proper interactions with the practitioners (village vaidyas) and patients, a few plats, have been selected for invstigation. These herbs have been used for the treatment of liver disorder, birth control and diabetes.

The investigation focused on plants of these areas, namely Leucas lavendulefolia, Vitex negundu, Costus speciosus and Clerodendrom Colebrookianum which have been claimed to be very effective in treatment of liver disorder, like Jaundice and Hypertension.

EXPERIMENTAL :

The aqueous (lyphelised) and methanolic (flash evaporated) extracts of Leucas lavendulaefolia and costus speciosus have prepared and the body weight was taken for this study. They were subdivided into a) Vehicle control, b) Toxin control, c) Test extract group, d) Test extract control group and e) Standard group 7-8 rats in each group were taken and the plant extracts were administered in various concentrations to the rats for different time periods. Paracetamol (2g/kg) and Carbon-tetrachloride. (2.5 ml/kg) were used as toxin to damage the liver of the animals.

Results of the studies can be summarised as follows :

i) There was a significant (p.0.05) increase in SGOT and SGPT, alkaline phosphatase and gama-GT in the toxin treated group as compared to the control.

ii) Administration of the extracts of the plants along with the toxin decreased the elevated serum enzyme levels almost near to the controls significantly.

iii) The results of the extracts treated groups are closely comparable to the Standard hepatoprotective

drugs group.

The histopathology results confirmed the hepatoprotective effect of these extracts of the plants. While Toxin treated groups showed large areas of cosinophilic hepatocytes in periportal and occasionally in parenchymal areas, there was a marked reduction in liver pathology of the rats treated with plant extracts, except for some occasional focal inflamation.

(2) Rhyzobiology

Research activities on Rhizobiology and Biofertilizer for improvement of pulse production in Assam is continuing and project completion report of studies on Rhyzobium for improvement of pulse production in Assam has been submitted to DBT, Govt. of India. Main activites continuing are as below :

(i) Maintenance of the six native, acid tolerance and wide range capable strains viz. AR-1, I-R-1, BR-12, BR-S, AR-10 and GR-21 are going on with experiments on different organic manures and compost to determine the production profile of the test pulses viz. Black gram, Green gram, Suybean and Cow-pea.

(ii) Isolation, identification and multiplication of VAM fungi from native soils are going on to determine the effect of Dual inoculation (Rhizobia and VAMF) for improvement of test (Black gram and Green gram) production.

So far as the research activities of the project on "Survey collection and study and phytopathogenic fungi on cultivated crops of Assam", sponsored by the ASTEC, Govt. of Assam, the following activities have been completed so far and final project report is under preparation to submit it to the source of finance, ASTEC.

(i) Sample of disease plants/plant parts of the following crops have been collected from four district of Assam as given below :

Crop	Disease	Causal organism (District)	Colection place
1. Potato	Lati-flight of potato.	Phytophthora infestans	
2. Rice	Blast of rice	Pyricularia Oryzeal	Nagaon, Sonitpur
3. Sugarcane	Red rot of Sugarcan	Colletotrichum falcatum	Jorhat and Lakhimpur

(ii) Causal organism of Late flight of potato, Blast of rice and red-rot of sugarcan as mentioned above were isolated and identified. Rating of the strains of the above causal organism have been done along with their physiology of growth in different nutritional media and with different parameters viz.

PH, temperature, RH, light and darkness etc.

(iii) Germination of spores, formation of hostoria, penetration and disease establishment in the host (host-parasite relationship) along with maceration of host tissues due to toxins produced have been studied in details.

(iv) Sources of inoculum and crop loss due to the above diseases have been studied.

(v) Chemical and physical parameter of the respective soils and weather factors like temperature, rainfall, relative humidity etc. have been prepared along with the disease free and disease prone zones and seasons for disease forecasting in future crop planning in the state.

(vi) Biocontrol of the above two diseases : Red-rot of sugarcan and late flight of potato have tried with biocontrol agents viz species of Trichoderma and Basilus subtilis and an encouraging results over the chemical control have been achieved.

RESEARCH PUBLICATION

Life Sciences :

1. Saikia,R.; Deka,A.K.; Kalita,R.; Bora,S.P. and Azad, P. (1998) : Effect of season, plant age and leaf position on latye blight of potato, Neobotanica Jr. Vol.6, No. 1&2, PP 23-26.

2. Saikia,R., Deka, A.K. and Azad,P. (1998) : Effect of some Trichoderma Sp. Against Colletotrichum falcatum Went. With special reference to temperature, pH,carbon and nitrogen levels. Jour. Agric. Sci. Soct. NE India, Vol. II No. (1) PP.91-93.

3. Deka, A.K.; Phookan, A.K. and Azad, P. : Survival of Sarocladium oryzae, the incitant of sheath rot of rice, in leaf sheath and stubbles' of rice in Assam, Jour. Pestology, Vol.XXII.,No.8.(1998).

ABSTRACT :

1. Deka, A.K., Kalita, R. Saikia, R and Azad,P. (1998) : Isolation of native strains of Rhizobium from Assam. Abs NO. 74 of National conference on impact of Biotechnology and modern Horticulture on rural Development, Jadavpur university, Calcutta.

2. Kalita, R., Deka, A.K., Saikia, R. and Azad P. (1998) : Evaluation of efficient native Rhizobial strains of Assam. Abs. of paper, Technical season, Assam science society. Pp. B-24.

3. Saikia, R., Deka, A.K. Kalita, R. and Azad P. (1998) : In vitro effect of some biocontrol agents on the growth of C. falcatum went Abstract of papers, Annual technical Session, Assam Science Society. Abs.Pp. B-29.

1. SERICULTURE

"Development of Muga culture with Special Reference to Indoor Rearing technique", funded by the DST, Govt. of India.

Another demonstration-cum-training program on indoor rearing technique of muga silkworm was carried out, as provided under the project, at the Institute of Advanced study in science and Technology, Khanapara itself. Altogether sixteen trainees participated in the programme. Out of these, fourteen were female and the other two were male, deputed by the state Sericulture Department of Assam.

The crop to be raised under a very adverse atmospheric conditions during the month of March/April but it was found to be a successful one in the sense that the norms which attained maturity were as good as those of September/October crops. However, some fourth stage worms died as those had to face extreme types of temperature and humidity, viz, 36^{0}c and 42 percent respectively when they require only 25^{0}c and 65 percent respectively for their normal growth and development. It is heartening to note that Hon'ble Minister of Sericulture, State Govt. of Assam along with counterpart from W.B. Government, Commissioner of Sericulture and Director of Sericulture of Assam, Director (NE) of the Central Silk Board And some other Scientists and Officers visited the rearing and pleased to see the worms attaining the maturity stage under indoor condition with normal growth and development.

(3) Eri Silkworm :

Seven ecoraces of Eri Silkworm (Philosamia ricini) were colected from different parts of N.E. region viz. Borduar, Titabar, Nongpoh, Sille, Mendipather, Dhervebhanga and khanapara and were evaluated for their rearing performances on castor (Ricinus communis) leaves during different seasons. Borduar race wasfound to be the best with respect to fecundity, larval weight, ERR, Cocoon weight and shell weight, significant vaiation in the total protein contest was noted among the stocks, however, variation among the strains of Titabar and Borduar were found to be insignificant. Protein profiles of different stocks of eri silkworm are being compared using SDS-PAGE. The possible role of protein content in relation to the commercial characters of different stocks have been characterized. The food plant garden of eri silkworm (Castor & Tapioca) have been maintained.

Awards :

R. Devi of LSD has been awarded the Ph.D. degree by Gauhati University in 1999. The title of the thesis is "Study of the hypolipidaemic effect of Clerdendron colebroonianum, Walp (Nafafu)".

Other Activities :

1. Dr. Depali Devi participated in the 3rd International Conference on Wild Silkmoth held at Bhubaneswar, India during 1st to 6th Nov'98.
2. Dr. Depali Devi participated in the awarness workshop of 'NSTMIS' schemes sponsored by DST, GOI on Feb.6,1999 at Guwahati.

ONGOING PROJECTS :

1. 'Development of Plasma Physics Division at IASST "Sponsored by the Department of Science & Technology, Govt. of India.

Research Group :

1.	Dr. Joyanti Chutia	:	Principal Investigator
2.	Dr. G.C. Das	:	Co-Investigator
3.	Dr. A.R. Hazarika	:	Research Associate
4.	Dr. Arun Kr. Sarma	:	Research Associate
5.	Mr. Ramprakash Lavania	:	JRF
6.	Ms. Barnali Sinha	:	JRF

2. "Development of Mathematical and Statistical Science at IASST" Sponsored by the Department of Science & Technology, Govt. of India.

Research Group :

1.	Dr. B.C. Tripathy	:	Principal Investigator
2.	Dr.(Mrs.) M.R. Agrawal	:	Co-Investigator
3.	Dr. G. Choudhury	:	Co-Investigator
4.	Ms. Barnali Dutta	:	JRF
5.	Ms. Sangeeta Kalita	:	JRF
6.	Ms. Mousumi Sen	:	JRF

3. "Development of Herbal medicine with special reference to Hepatic Disorder" Sponsored by the Department of Science & Technology, Govt. of India.

Research Group :

1.	Dr. J. Kotoky	:	Principal Investigator
2.	Dr. P.N. Das	:	Co-Investigator
3.	Sri J.C. Gogoi	:	JRF
4.	Sri D. Duwarah	:	JRF
5.	Smt. R.L. Devi	:	Sr. Research Assistant
6.	Sri N. Sharma	:	Sr. Research Assistant cum animal keeper

4. "Development of Muga Culture with special reference to indoor rearing technique" sponsored by Department of Science & Technology, Govt. of India (Project completed)

Research Group :

1.	Dr. J.N. Talukdar	:	Principal Investigator

2.	Sri S. Goswami	:	Lab Assistant
3.	Sri T. Talukdar	:	Lab Attendant
4.	Sri Balin Das	:	Field Helper

5. "Development isozyme marker for different stocks of Eri Silkworm" sponsored by Department of Biotechnology, Govt. of India.

Research Group :

1.	Dr.(Mrs.) D. Devi	:	Principal Investigator
2.	Dr. D.K. Sharma	:	Co-Investigator
3.	Md. Sirajuddin Talukdar	:	SRF
4.	Mr. J. Deka	:	Field Assistant

6. "Survey, Collection of phytopathogenic fungi on cultivated crop of Assam" Sponsored by ASTEC, Govt. of Assam. (Project completed).

Research Group :

1.	Dr. P. Azad	:	Principal Investigator
2.	Sri R. Saikia	:	JRF

COMPUTER SCIENCE DIVISION :

The Computer Science Division is engaged primarily in education and training in the field of Computer Science and Application. It has been conducting the following three courses :

1. Post Graduate Diploma in Computer Application (PGDCA) of One Year duration under the State Council for Technical Education & DTE, Govt. of Assam.

2. DOEACC "A" Level Course of one year duration (Recognised by DOE)

3. Advanced Certificate Course of Six months duration.

During 1998-99, the No. of students passed under each category are as follows :

		Appeared	Passed
1.	PGDCA	25	24
2.	DOEACC "A" Level	46	30
3.	Advanced Certificate Course	35	35

Besides conducting the regular courses, the Computer Science Division has also been catering to Research works of all the divisions of IASST by providing Computer Time & Consultancy service

LIBRARY & INFORMATION CENTRE :

The Library & Information Centre of the IASST has a total number of nearly 2500 volumes of books, 13 foreign and 29 Indian Journals have been subscribed and there are a number of periodicals news papers, magazins etc. The library has provided reprographic services and during the period 1998-99 about 54,300 pages were photocopied. the service was extended to Computer Science Students, researdh scholers and institutes in and around Guwahati. The library possess 385 bound volumes of journals/ periodicals in plasma physics, Mathamatics, resource management & Environment and Life Science Division.

The total number of these & Dissertations in the library is 84. The institute has been receiving 106 number of reports, news letter, house bulletin annually from different institutions.

List of Journals Subscribed, IASST.

Plasma Physics Division :

Foreign Journals :

1. Physics of Plasmas.
2. Plasma Physics and controlled fusion.
3. Journal of Plasma Physics.
4. Review of Scientific Instruments.
5. Plasma Physics Reports.

Indian Journals :

6. Indian Journals of pure & applied Physics.
7. Pramana Journal of Physics.
8. Journal of Astrophysics and astronomy.

Mathematical Science Division :

Foreign Journal :

9. Queing System : Theory & Applications.
10. Journal of Applied Probability.
11. Current Mathematical Publication.
12. Proceeding of the American Mathematical Science.
13. American Mathematical Monthly.
14. International Journal of Mathematics & Mathematical Science.
15. Indian University Mathematics Journals.

Indian Journals

16. Stochastic Modeling & Applications.
17. Bulletin of the Calcutta Mathematical Society.

18. The Journal of Analysis.
19. Journal of Indian Statistical Association.
20. IAPQR Journal.
21. Indian Journal of Pure & Applied Mathematics.
22. Indian Journal Of Mathematics.
23. Far East Journal of Theoretical Statistics.

Computer Science Division :

24. Express Computers.
25. Computer To-day
26. PC-Quest
27. Data Quest.
28. Computer (a) Home.
29. Chips.
30. Chips Special on Internet.
31. Chips Special on TIps & Tricks.

Life Science Division :

Foreign Journal :

32. Sericologia.

Indian Journals :

33. Seridoc.
34. Indian Silk.

Resourse Management and Environment Division :

Indian Journals :

35. Journal of Biosciences
36. Journal of Environmental Biology.
37. Indian Journal of Environmental Health.
38. Pollution research.
39. Ecology, Environment & conservation.
40. Journal of Industrial pollution control.
41. Environment & Ecology.

Other Journals / Megazins

42. Science Reporter.
43. Current Science.

Consolidated Receipt & Payment Accounts of IASST
for the year, 1998-99

Sl. No.	Head of Accounts	Receipt	Payment
1.	Opening balance	Rs. 23,69,968.06	---------
2.	Dev. of Math. Div.	17,75,000.00	15,60,045.80
3.	Dev. of Plasma Phy. Div.	12,40,000.00	14.82.751.00
4.	Dev. of Herbal Medicine.	75,000.00	2,46,470.50
5.	Dev. of Muga Culture	2,00,000.00	1,59,639.60
6.	Dev. of Eri Project	1,02,000.00	1,38,616.00
7.	Career Profile Project.	49,650.00	61,779.00
8.	Sheath Non-Linear in Plasma.	----------	1,400.00
9.	Survey & Collection of Fungi.	41.600.00	41,813.00
10.	Biofertilizer Project	1,15,103.00	---------
11.	Micro-method project	7,782.00	---------
12.	Education	3,00,000.00	4,86,144.00
13.	Land & Building	---------	--------
14.	General Office Management.	43,00,000.00	43,00,155.50
15.	IASST General.	6,54,525.00	4,78,237.00
17.	Reserve Fund. Rs. 7,06,000.00		
18.	Closing Balance	---------	22,73,522.60
	Total	Rs 1,12,30,628.06	Rs. 1,12,30,628.06

Consolidated Receipts and Payments Accounts of IASST for the year 1998-99

Sl. No.	Name of Division	Opening balance as on 1-4-98	Receipt during the year	Total	Payment for the year	Closing balance as on 31-3-99
1.	Development of Mathematicals Science Division.	Rs. 3,56,348.00	Rs. 17,75,000.00	Rs. 21,31,348.00	Rs. 15,60,045.80	Rs. 5,71,302.20
2.	Development of Plasms Phisics Division	3,97,714.90	12,40,000.00	16,37,714.90	14,82,751.00	1,54,963.90
3.	Herbal Medicine	1,33,382.00	75,000.00	2,08,382.00	2,46,470.50	(-) 38,088.50
4.	Muga Culture	(-) 74,887.00	2,00,000.00	1,25,113.00	1,59,693.60	(-) 34,580.60
5.	Career Profile Project	10,935.00	49,650.00	60,585.00	61,779.00	(-) 1,194.00
6.	Sheath Non-Linear Plasma	1,401.00	----------	1,401.00	1,400.00	1.00
7.	Survey Collection of Fungi	10,053.00	41,600.00	51,653.00	41,813.00	9,840.00
8.	Biofertilizer Project	(-) 1,95,328.00	1,15,103.00	(-) 80,225.00	--------	(-) 80,225.00
9.	Eri Project	58,395.00	1,02,000.00	1,60,395.00	1,38,616.00	21,779.00
10	Micro Method	(-) 7,782.00	7,782.00	---------	--------	--------
11.	Seed Money	(-) 75.00	--------	(-) 75.00	--------	(-) 75.00
12.	Education	1,84,880.34	3,00,000.00	4,84,880.34	4,86,144.00	(-) 1,263.66
13.	Land & Building	18,84,010.00	--------	18,84,010.00	--------	18,84,010.00
14.	General (a) Office Management (b) Plasma Physics Div. (c) Life Science Div. (d) RM&E Division. (e) Computer Sci. Div.	(-) 33,00,552.98	43,00,000.00	9,99,447.02	43,00,155.50	(-) 33,00,708.48
15.	Reserve Fund	(-) 1,06,000.00	-------	(-) 1,06,000.00	-------	(-) 1,06,000.00
16.	IASST General	30,17,473.80	6,54,525.00	36,71,998.80	4,78,237.00	31,93,761.80
	Total	Rs. 23,69,968.06	Rs. 88,60,660.00	Rs. 1,12,30,628.06	Rs. 89,57,105.40	Rs. 22,73,522.66