IMST 2009 - FIM XVIII

August 2-4, 2009

SOUVENIR & ABSTRACTS

Eighteenth International Conference on

Interdisciplinary Mathematical and Statistical Techniques

Organized by

Department of Mathematics
Jaypee University of Information Technology
Waknaghat-173215, Himachal Pradesh, India
www.juit.ac.in

&

Forum for Interdisciplinary Mathematics
www.forum4interdisciplinary-math.com

IMST 2009 - FIM XVIII

August 2-4, 2009

SOUVENIR

Jaypee University of Information Technology
Waknaghat-173215, Himachal Pradesh, India
www.juit.ac.in

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
Waknaghat, P.O. Dumehar, Kandaghat, Distt. Solan-173 215 (H.P.) INDIA
Phone : (91) 1792 245365 to 69
Fax : (91) 1792 245268

20th July, 2009

MESSAGE

It gives me immense pleasure to know that the Jaypee University of Information Technology, Waknaghat in association with the Forum of Interdisciplinary Mathematics shall be holding the *Eighteenth International Conference on Interdisciplinary Mathematics and Statistical Techniques (IMST 2009 – FIM XVII)* at the JUIT campus during August 2-4, 2009.

Several eminent mathematicians, scientists and technologists from all round the globe shall be meeting at JUIT to place their research work before the august assembly and therefore leading to in-depth discussions on relevance of Mathematical Sciences in Science and Technology. It is important to note that in view of the increasing application of Mathematics and Statistics in diverse fields, the focus of the Conference is on the interdisciplinary aspects and applications.

I heartily welcome and extend my best wishes to all the participants and wish the Conference a grand success.

MANOJ GAUR
PRO CHANCELLOR

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
Waknaghat, P.O. Dumehar Bani, Kandaghat, Distt. Solan - 173215 (H.P.) INDIA
Website : www.juit.ac.in
E-mai: yaj.medury@juit.ac.in
Phone No. (91) 01792-245361,239201 Fax: (91) 01792 245362
Resi.: (91)1792-245361, 239271

Dr. Y.Medury
Vice-Chancellor

MESSAGE

I am delighted to note that the Jaypee University of Information Technology, Waknaghat in association with the Forum of Interdisciplinary Mathematics shall be holding the *Eighteenth International Conference on Interdisciplinary Mathematics and Statistical Techniques (IMST 2009 – FIM XVIII)* at the JUIT campus during August 2-4, 2009.

I welcome eminent mathematicians, scientists and technologists from all round the globe, who shall be meeting at the Jaypee University, to inform and engage all delegates with their research findings. The Conference aims to stimulate in-depth discussions on the role and specific emphasis of Mathematical Sciences in Engineering Education. The Conference, through the wide range of paper presentations, will focus on the interdisciplinary aspects and applications of Mathematics & Statistics.

I extend my best wishes to all the participants and wish the Conference a grand success.

21 July 2009.

YAJULU MEDURY

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
(Established by H.P. State Legislative vide Act No. 14 of 2002)
Waknaghat, P.O. Dumehar Bani, Kandaghat, Distt. Solan – 173215 (H.P.) INDIA
Website : www.juit.ac.in
Phone No. (91) 01792-257999 (30 Lines)
Fax : (91) 01792 245362

Date: July 21, 2009

MESSAGE

I welcome the participants of the 18th International Conference of the Forum for Interdisciplinary Mathematics entitled "Interdisciplinary Mathematical and Statistical Techniques" and wish them many gainful interactions during the conference. I also wish the organizers of the conference a very successful conference. I am sure that the participants and the organizers will both benefit academically from this conference.

T.S. Lamba
Dean (A & R)

IMST 2009 - FIM XVIII

Eighteenth International Conference of
Forum for Interdisciplinary Mathematics

Interdisciplinary Mathematical & Statistical Techniques

August 2 - 4, 2009

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
Waknaghat, 173215 Himachal Pradesh India

July 27, 2009

FROM THE CO-CHAIRS

On behalf of Organizing Committees of **IMST 2009-FIM XVIII**, we extend a warm welcome to the delegates of this conference. With the help of the International Organizing and Advisory Committees, and Local Organizing Committee we are delighted to arrange such an incredible conference schedule. The presence of several giants at this conference from various fields of expertise indicates their love and devotion to their areas of inquiries. They have been generous in accepting our invitation to be part of this year's plenary slate. It is they who have blazed the trails in their own way and continue to act as role-models to us and future generation of scholars. We salute them for their contributions.

We take this time to thank the members of International and Local Organizing Committees, whose efforts have brought fruition to bring such an internationally stellar assembly of scholars under the joint umbrella of FIM-JUIT Waknaghat.

One of the challenges for the scientists during this era is to apply their highly specialized research across various fields of human knowledge and engage in interdisciplinary investigations. This premise is becoming inevitably common for the scholars. Indispensability of Mathematics and Statistics to carry out any quantitative and qualitative study has dwarfed other fields in their shear appeal and application. Forum - an India based non-profit society of international scholars and Jaypee University of Information Technology – first privately funded University of India established under Act No. 14 (2002) of Himachal Pradesh Government for providing Technical Education - are elated to bring this large international conference to Waknaghat. We hope this will bring intellectually stimulating interactions and productive ideas that would be globally beneficial.

Finally, we acknowledge and thank Sh Manoj Gaur, Chairman Jaiprakash Sewa Sansthan and Pro-Chancellor of the University, Dr. Y Medury Vice Chancellor for providing liberal funding for the conference. We are highly obliged to Brig. (Retd) Balbir Singh, the Registrar of the University for providing all kinds of logistic support We are eternally indebted to Forum for Interdisciplinary Mathematics, Journal of Combinatorics, Information & System Sciences (JCISS) and Journal of Statistics and Applications.

With sincere regards,

Satya Mishra.

Harinder Singh

The Jaypee Group: At a Glance

The Jaypee Group is a well diversified conglomerate with a turnover of over Rs.5,500 crore and has a formidable experience in Engineering & Construction along with strong presence in Power, Cement and Hospitality. The conglomerate has also expanded into Real Estate & Expressways.

The Engineering and Construction wing of the Group is an acknowledged leader in the construction of multipurpose River Valley and Hydropower projects. It has the unique distinction of having simultaneously executed 13 Hydropower projects spread across 6 states and a neighbouring country, Bhutan, for generating 10,290 MW power.

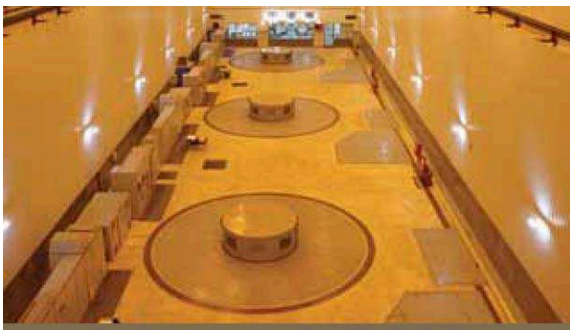
The Group has been assigned "CR1" grade by ICRA Ltd., indicating very strong contract execution capacity. A leader in Engineering and Construction of Hydropower projects in India, the Group has the largest market share in the Indian Hydropower sector having participated in 54% of Hydropower projects developed in 10^{th} 5 -Year plan in different capacities.

Jaiprakash Associates Limited (JAL) is the only integrated solution provider for Hydropower projects in the country with a track record of strong project implementation. It has participated in projects that have added over 8840 MW of Hydro Electricity to the National grid between 2002 to 2008.

The key projects completed/under execution across India are:

- 1450 MW Sardar Sarovar project, the largest water resource project in India
- 1000 MW Tehri Dam, Asia's highest rock fill dam
- 1000 MW Indira Sagar powerhouse, second largest surface powerhouse in the country
- 1500 MW Nathpa Jhakri powerhouse, the largest under-ground surface powerhouse in the country

1450 MW Sardar Sarovar Dam, Gujarat



Machine hall of 300 MW Baspa-II power station, H.P.

The in-house Design and Consultancy Company, Jaypee Ventures Pvt. Ltd. (JVPL), gives JAL a competitive edge over its rivals.

The Group, with its operational projects of 300 MW Baspa-II & 400 MW Vishnuprayag, is India's largest private sector Hydropower producer. Besides this, 1000 MW Karcham Wangtoo project is under advanced stage of implementation. In addition, with 2900 MW projects (2400 MW Lower Siang & 500 MW f-iirong) coming up in Arunachal Pradesh & 720 MW (270 MW Umngot & 450 MW Kynshi Stage-II) in Meghalaya, the Group will have total hydropower generation capacity of over 5000 MW by 2016.

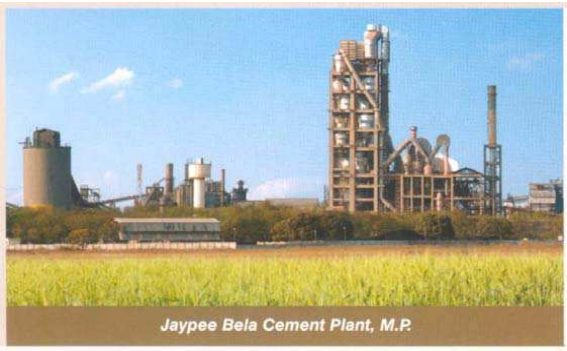
After having established a strong presence in the hydropower sector the Group has initiated its entry into Thermal Power Generation and is in the process of implementing 2570 MW Thermal Power Projects. The Group is also implementing a Transmission System associated with the 1000 MW Karcham Wangtoo Hydroelectric project. The Transmission project will consist of a 230 km long transmission line between Wangtoo in Himachal Pradesh and Abdullapur in Haryana.

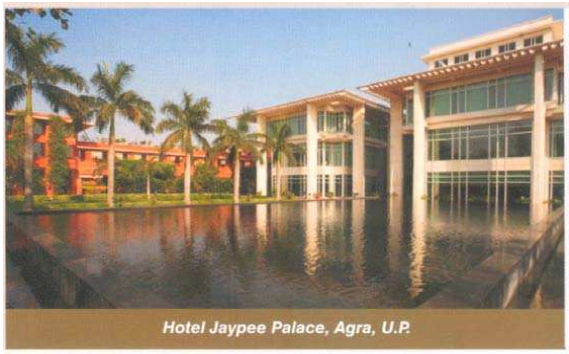
Jaypee Group has become the 3^{rd} largest cement producer in the country within 25 years of existence. Its cement division currently operates modern, computerized process control cement plants with an aggregate capacity of 9.0 MTPA. The company is in the midst of capacity expansion of its cement business in Northern, Southern, Central, Eastern and Western parts of the country and is slated to be a 25 MTPA cement producer by the year 2010 and 30.5 MTPA by 2011 with Captive Thermal Power plants totaling 308 MW. Post expansion, the Group will have 9 integrated cement plants supported by 308 MW of Captive Thermal Power, 10 Grinding Units and one jetty giving the Group a pan India presence in cement sector.

The Group owns and operates 4 Five Star Hotels, two in New Delhi and one each in Agra and Mussoorie with a total capacity of 643 rooms. Another state-of-the-art resort and SPA of 250 rooms is being set up in collaboration with SIX SENSES at Greater Noida.

Jaypee Group is a pioneer in the development of India's first golf centric Real Estate. Jaypee Greens - a world class fully integrated complex consists of an 18-hole Greg Norman Golf Course. Stretching over 450 acres, it also includes residences, commercial spaces, corporate park, entertainment and nature in abundance.

The Group is constructing 165 km long 6 lane Yamuna Expressway project from Noida to Agra and ribbon development on 6250 acres at five or more locations. In addition to this, 1047 km long 8 lane Ganga Expressway from Greater Noida to Ballia (Eastern Uttar Pradesh) will also be developed by the Group which will be the largest private sector infrastructure project in India.


Jaypee Bela Cement Plant, M.P.


Hotel Jaypee Palace, Agra, U.P.

Shri Jaiprakash Gaur ji, Founder Chairman of the Group firmly believes that quality education on an affordable basis is the biggest service which, as a corporate citizen, we can provide.

Jaypee Group currently provides education across all spectrum of the learning curve through 16 schools, 2 ITIs and 3 universities catering to over 20,000 students.

The Jaypee education system plans to take the vision of service to society through quality education to another plane by expanding its infrastructure to provide education to a universe of 100,000 students in less than a decade from now.

Jaiprakash Sewa Sansthan (JSS)

The Jaypee Group of Companies has consistently displayed full awareness of its social responsibilities through the Jaiprakash Sewa Sansthan (JSS), a 'not for profit' trust registered under the Income Tax Act, 1961. It has been established to discharge its responsibility towards the society. The Sansthan functions with a holistic approach for overall socio-economic development. Set up in 1993, the trust aims to reduce the pain and distress in the society. The Group firmly believes that Education is the cornerstone to economic development and the strength of 1 billion Indians can be channelized by education alone to build India into a developed nation. The Group currently offers education through 16 schools, 2 ITIs and 3 universities catering to over 20,000 students and has an objective to equip at least 1 lac students with the power of education by 2013.

JSS has translated its social responsibility into reality by building up schools and training institutes that cater to the needs of providing quality education to the rural masses. The Comprehensive Rural Development Programme (CRDP) covers a wide range of projects such as free medical camps, health check-ups for village school children, literacy campaigns, safe drinking water supply, creating water reservoirs in villages, and vocational training for women. Further, green initiatives include afforestation drives, conservation of natural resources, emphasis on the control of air quality and noise pollution.

With the thought of using technology effectively for economic growth, the visionary founder of the JSS, Shri Jaiprakash Gaur set up 3 higher technical institutes - Jaypee Institute of Information Technology University (JIIT) at Noida; Jaypee University of Information Technology (JUIT) at Waknaghat, Himachal Pradesh; and Jaypee Institute of Engineering & Technology (JIET) at Guna, Madhya Pradesh - to host the best of faculty, students and educational infrastructure to ensure creation, generation, dissemination and application of knowledge to mould the world leaders of tomorrow.

The three institutes have been envisioned to reflect the motto "Education, Empowerment and Enlightenment". The institutes strive to bring innovation, creation and flexibility to the curriculum through credit and non-credit courses, open-ended projects with emphasis on problem-solving through experimentation and design exercises, and creative and challenging home assignments, They also have sufficient orientation to international competitiveness, quality management, and problem solving in different socio-political and economic environments. Special features include development of entrepreneurial skills; strong industry orientation and providing experience of working in interdisciplinary teams.

The other initiatives of JSS include primary and secondary schools, vocational technical training institutes and a degree college. A few of the more prominent ones are listed below.

Primary to Higher Secondary

- Sher Singh Harswaroop Vidyalaya, Village Chitta, U. P (student strength - 380)
- LDAV Primary School, Anoopshahar, U.P. (student strength - 80)
- LDAV Kanya Pathshala, Anoopshahar, U.P. (student strength - 302)
- LDAV Inter College, Anoopshahar, U.P. (student strength -1700)
- Jaypee Vidya Mandir, Anoopshahar, U.P. (student strength - 937)

- Jay Jyoti Uchhatar Madhyamik Vidyalaya, Dalla, U.P. (student strength - 414)
- Jay Jyoti Uchhatar Madhyamik Vidyalaya, Churk, U.P. (student strength - 690)
- Jay Jyoti Uchhatar Madhyamik Vidyalaya, Chunar, U.P. (student strength - 163)
- Jay Jyoti Uchhatar Madhyamik Vidyalaya, Gurma, U.P. (student strength - 356)
- Jay Jyoti School, Rewa, M.P. (student strength - 950)
- Jay Jyoti School, Guna, M.P. (student strength - 260)
- Sardar Patel Uchhatar Madhyamik Vidyalaya, Rewa, M.P. (student strength - 2500)
- Sardar Patel Uchhatar Madhyamik Vidyalaya, Sidhi, M.P. (student strength - 272)
- Jay Jyoti Girls School, Kevadia, Gujarat (student strength - 217)
- Sardar Patel Vidyalaya, Bhuj, Gujarat (student strength - 90)
- Jay Jyoti School, Sholtu, H.P. (student strength - 100)

Vocational Technical Training

- M. Gopala Rao Industrial Training Institute, Rewa, M.P.
- Jaypee Polytechnic and Training College, Samirpur, H.P.
- Vishwakarma Udhyogic Prashikshan Kendra, Dalla, U.P.

Degree College

- Durga Prasad Baljit Singh (PG) Degree College, Anoopshahar, U.P.
- Jaypee College of Education, Rewa, M.P.

Jaypee Polytechnic & Training College, Samirpur (H.P.)

Jaypee University of Information Technology, Waknaghat

Genesis

The University was set up by Act No. 14 of 2002 vide Extraordinary Gazette notification of Government of Himachal Pradesh dated May 23, 2002 and approved by the University Grants Commission under section 2(f) of the UGC Act.

Vision

To become a Center of Excellence in the field of IT & related emerging areas, education, training and research comparable to the best in the world for producing professionals who shall be leaders in innovation, entrepreneurship, creativity and management.

The Campus

The University is spread over 10 hectares of lush green picturesque slopes of Waknaghat, in District Solan of Himachal Pradesh, creating a tranquil environment that can heighten the spirit and energy level of all learners and inspire them to optimize their learning efforts. Functionally and aesthetically spread out, the architectural plan builds on providing an intellectual ambience in clusters in an exciting landscape that is easy flowing and community-friendly.

The Campus, covering a total built up area of over 100,000 sq.m. comprises the Academic Block (with lecture theatres, classrooms, tutorial rooms, laboratories, administrative and faculty offices, and the library), hostel residences for boys and girls (around 1800 students), faculty residences, Guest House, Annapurna, Auditorium, sports facilities and other associated services. At present, around 1650 students (boys and girls) along with 90 faculty members reside on the campus. Internet connectivity is available to all the faculty members and students.

Campus Life

The University encourages all students to make the life outside the classroom vibrant and enjoyable by engaging themselves in multiple extracurricular areas, no matter how talented or experienced they are in any of those areas. This is enhanced by best of facilities and equipment designed to make life outside the classroom an exciting & memorable experience.

Computational Facilities/Laboratories

JUIT is a wired campus with a fiber-optic network connecting its labs, classrooms, library, and student hostels. The computing infrastructure consists of state-of-the-art multiprocessor servers accessed by an array of multimedia desktops. The University has seven computer laboratories - with more than 700 nodes operating on UNIX; Windows 2000/Linux environment. All the lecture theatres/classrooms have multimedia projection systems for facilitating computer-based and web-based learning. Besides the computer laboratories, the University has other well-equipped labs in Electronics, Communication, Bioinformatics/Biotechnology and Civil Engineering disciplines. A language laboratory has also been commissioned to assist students to enhance their language communication skills.

Learning Resource Center, JUIT

Learning Resource Centre (LRC) is a back bone of academic and research activities of the University and has been catering to the information needs of the faculty members, students, staff, and research scholars. It has around **25000** volumes of books and more then **4000** e-journals which are covering the disciplines of Computer Science, Information Technology, Biotechnology, Bioinformatics, Civil and Environmental Engineering, Mathematics, Physics and Materials Science, Humanities, Management and other areas related to Engineering, Science and Technology. The collection comprises printed documents such as books, reports, theses, standards, atlases, patents and back volumes of journals. LRC is regularly subscribing **38** International, **44** National and **45** national and international magazines regularly in order to supplement research and development activities of the university. The non-book collections include material like audio/video cassettes and CD-ROM discs etc. The LRC is a member of Indian National Digital Library in Engineering, Sciences and Technology and All India Council of Technical Education (INDEST- AICTE) and has been subscribing ASCE, IEEE, ACM, Springer Link and Emerald Management Xtra digital libraries. The faculty and student research community can access **16683** titles full text through out the campus without any barrier. LRC is also member of Developing Library Network (DELNET) for sharing the resources among its member libraries. LRC is subscribing databases of statistical importance from INDIASTAT and industrial database prowess. The LRC has four storied separate environmental friendly building which can accommodate around **295** users at a time to carry out academic and research activities such as reading books, accessing electronic journals, internet, computer programming and software development etc. It is connected to high speed internet and intranet of JUIT network. All activities of LRC are computerized, including bar-coded ID cards and separate On-line Public Access Catalogue (OPAC) terminals to know the status of books at any time. The LRC remains open 16 hours a day from 8 A.M. to 12 P.M except on holidays. LRC has implemented an integrated electromagnetic security system (3M India) for material movement. The LRC has also started the development of Institutional Repository by using DSpace, open source repository software.

Department of Biotechnology & Bioinformatics

The Department imparts education to equip students with modern skills compatible to the needs of industry and academia. Keeping in view the interdisciplinary nature of BT and BI, the curricula have been designed with an engineering base encompassing courses from computer science & engineering, electronics and communication engineering, mathematics, statistics, physics and professional development so as to enable students to work not only in the Biotechnology and Bioinformatics industries but also in other industries. The B. Tech. students are provided an opportunity to do a project in final year which helps them to handle independent projects in academia and industry.

The Department is equipped with 10 labs providing hands on training in various areas of biotechnology such as medical biotechnology, industrial biotechnology, environmental biotechnology, food biotechnology, agricultural biotechnology, plant biotechnology, pharmaceutical biotechnology, genomic & proteomic technologies, animal and plant cell culture technologies, etc. Our bioinformatics curriculum includes courses on algorithm design, machine learning, computational high throughput screening and drug designing, bioprogramming, scripting languages, etc. The BI graduates have an added advantage of working in Biotechnology, Bioinformatics, Pharmacy, and IT industries.

Courses Offered

- B. Tech.
- Ph.D.
- B.Tech - M.Tech (Dual Degree)
- B.Pharm - M.Pharm Practice (Dual Degree)

Research

The Department is actively involved in research by having the distinction of running externally funded R & D projects worth Rs. 2.5 crores from various Govt. of India agencies such as the Department of Biotechnology, Department of Science & Technology, DRDO, Ministry of Environment and Forest, and an industry AyurVet Ltd. Baddi sponsored project.

Department of Civil Engineering

The program in Civil Engineering has been developed to meet the latest requirements of the infrastructural development of our country in areas like construction, Transportation, Hydropower and Environmental Engineering. The curriculum has been developed to keep it practice and industry oriented without losing its academic focus.

Students are provided with comprehensive theoretical knowledge through lectures, tutorials and assignments covering the basic as well as advanced topics in various subjects of civil engineering. They are trained for practical understanding in departmental laboratories namely Concrete and Structural Engineering, Geotechnical Engineering, Environmental Engineering, Highway Engineering and Surveying in addition to the traditional Engineering Graphics and Workshop Practices. All laboratories are equipped with modern equipments and facilities and highly trained manpower. Students are exposed to construction industry during the practical training in reputed construction companies.

Training on softwares like STAAD Pro, MATLAB, Auto-CAD and PRIMAVIRA enhances employability of students in the various fields of Civil Engineering. Opportunities are provided to students for postgraduation and research in the areas of Geotechnical, Structural, Environmental and Transportation Engineering.

Courses Offered

- B. Tech.
- M. Tech.
- Ph.D.

Research

The Department does R&D in areas like the development of software for slope stability, flow of water around hydraulic structures, development of mini-standard penetration test, and composite materials.

Department of Computer Science and IT Engineering

The programs in Computer Science and IT Engineering are balanced and well structured, with an objective to create well qualified engineers who can take up challenging tasks in the area of Computer Science and Engineering and Information Technology. Graduates would be able to take-up a variety of careers like teaching, research, design, development, entrepreneurship, software profession, manufacturing and management etc.

After preparing a good foundation in Basic Sciences, Mathematics, Basic Engineering, Humanities, Social Sciences and Management, these programs lay down adequate emphasis on many core subjects in CSE/IT. Most of the courses are supported by good laboratory practice through excellent computer laboratories and softwares. There is a provision of six elective subjects which a student can choose depending on market demand and his/her interest in emerging areas and need for further specialization. Though most of the courses have elements of research and design, a heavy emphasis on the final year project gives students an excellent opportunity to develop and demonstrate their innovative skills, design skills and research interests. These projects quite often lead to publications of their original work. Some of the core subjects of the programs include Object Oriented Programming, Micro Processors & Controllers, Algorithms, Operating Systems, Software Engineering, Computation Theory, Computer Networks, Compiler Design, Computer Organization and Architecture. Students have to undergo a through six-week mandatory Industrial Training at the end of their third year of study to get a feel of the work-culture in relevant industries.

Courses Offered

- B. Tech.
- M. Tech.
- Ph.D.

Research

The research thrust of the Department is in the engineering of software systems, data/knowledge based systems like database systems and data warehousing systems, information systems, requirements engineering, and computer networking.

Department of Electronics & Communication Engineering

The program aims at producing high quality engineers in the area of Electronics and Communication Engineering who can take up challenges in Design, Development, Research, Manufacturing, Management and Academics. Students get a good foundation in Basic Sciences, Mathematics, Basic Engineering and the many core subjects in Electronics & Communication Engineering. Through many Professional Development Courses which include Languages, Humanities, Social Sciences and Management, they turn out to be good professionals in their branch of specialization.

Some of the important compulsory subjects include Analog & Digital Electronics, Signals & Systems, Analog & Digital Communications, Digital Signal Processing, Electromagnetic Engineering, Telecommunication Networks and VLSI Technology. Comprehensive design oriented laboratory practice in core courses augment the understanding and intricate concepts of a subject, with experimental and practical skills tremendously enhancing student's self-confidence. Students are also required to take a good number of courses in Computer Science and Engineering to meet the requirements of academics as well as industry. The program is fully supported by excellent laboratory facilities. Options to take many elective subjects provide a wonderful opportunity to the students to go in for further specialization in ECE or broaden their knowledge to cater for the demands of the academics and industry. A strong emphasis on final year project makes the student confident in research, design, development, manufacturing and management. Students get a flavour of working in industry and the work culture there through the mandatory six-week Industrial Training at the end of the third year.

Courses Offered

- B. Tech.
- M. Tech.
- Ph.D.

Research

The Department carries out research in low power systems and wireless communication. It also works in the tera-hertz range of frequencies.

Department of Physics

Beside offering a number of courses for Undergraduate Engineering programmes, the Department of Physics also carries out Graduate Engineering Teaching and Research. The Department offers elective courses like Optical Fibre networks, wireless networks, Nano-science and technology, Bio-sensors to undergraduate students in Electronics and Communication, Computer Science/IT, and Biotechnology/Bioinformatics.

Courses Offered

- Ph.D.

Research

The Department has strong research interests in microwaves, compound semiconductors, and nano-materials. The Department has recently established a laboratory for the fabrication of thin film devices and nano-materials. A microwave antenna laboratory has also been set up. Research is carried out with a number of doctoral students in the fields of nano-materials and semiconductor devices as well as micro-strip antenna design.

Department of Professional Development

The Department was set up with the intention of producing well-rounded engineers, not only having good technological skills but also with the ability to interact with different organs of an organization. Thus, the Department develops 'soft' skills in students. These skills are group and co-operative working, economics, finance, project management etc. Additionally, the Department exposes students to entrepreneurship skills, HR management, Customer relationship management, total quality management etc. The Department has also a Communication Skill and Language Learning Lab to enable students to improve the language skills.

Courses Offered:

- Ph.D.

Department of Mathematics

Besides offering a number of core and elective courses for Undergraduate Engineering programmes, the Department of Mathematics offers the M.Tech. (Applied and Computational Mathematics) course. The Department emphasizes mathematical analysis, modeling, and reasoning with high exposure to computer based techniques. Students become adept at exploiting mathematical libraries for improved productivity and develop the ability to concentrate on core intellectual issues in problem solving rather than do the routine drudgery of calculations.

The Department is well equipped with softwares like MATLAB, Maple, Mathematica, SPSS, Lingo and Lindo. The Department has an active Doctoral programme. Since the establishment of the department in 2002, 4 faculty members have obtained Doctoral degree. One research scholar has been awarded the degree and two are working for it.

Courses Offered

- M. Tech.
- Ph.D.

Research

The Departmental research interests are in Applied Group theoretic techniques, applied mathematics areas like differential equations, wavelets; statistical inference, measurement

error models, restricted regression, and linear regression model; Stochastic Process, Application of Markov Random Field and Bayesian Techniques in Image Processing, Biostatistics, Statistical methods in Epidemiology; Algebraic Coding Theory; Sequence Design (Mobile Communications); Distributed Video Coding (Video Phone); Fuzzy Information Measures, Fuzzy Regression, Pattern Recognition; Linear Algebra, Numerical Methods, Operations Research, Mechanics of Continuous Media, Thermoelasticity, Elastic Waves, Seismology.

Ph. D. degrees awarded

- *Lie Symmetries And Exact Solutions Of Some Nonlinear Partial Differential Equations*, **Rajesh Kumar Gupta,** Department of Mathematics (2007).
- *OVSF Code Assignment Schemes at the Forward Link of WCDMA,* **D.S. Saini,** Department of Electronics and Communications (2008).
- *A New Approach to Stable Matching and Networks-on-Chip Problem*, **Nitin,** Department of Computer Science and Information Technology (2008).
- *An Optical Study of Chalcogenide Glasses Using UV-VIS-NIR Spectroscopy,* **Pankaj Sharma,** Department of Physics (2008).
- *Purification and characterization of a novel antilithiatic protein from the seeds of Dolichos biflorus and its validation in rat urolithiatic mode,* **Rakesh Kumar Bijarnia**,Department of Biotechnology and Bioinformatics (2008).
- *In vitro and in vivo studies on antilithiatic properties of trachyspermum ammi (L.),* **Tanzeer Kaur**, Department of Biotechnology and Bioinformatics (2009).
- *Fuzzy Regression, Clustering and Generalized Measures of Fuzzy Information,* **Rakesh Kumar Bajaj**, Department of Mathematics (2009).
- *An Optical and Electrical Study of a-Ge-Se-In and a-Ge-In-Bi Glassy Alloys,* **Ishu**, Department of Physics (2009).
- *Polynomial based design of linear phase recursive and non-recursive filters,* **Vinay Kumar**, Department of Electronics and Communications (2009).

Scholars pursuing Ph. D.

Department	**Scholars**
Biotechnology and Bioinformatics	24
Civil Engineering	1
Computer Science and IT Engineering	7
Electronics and Communication Engineering	11
Mathematics	2
Physics	3
Professional Development	5

Forum for Interdisciplinary Mathematics

A Multidisciplinary Academic Society Registered in India

Mathematical Sciences form a basis for all quantitative developments, reasoning and research; be it technology, physical and engineering sciences, life and medical sciences, earth sciences, economics, behavioral and management sciences, and the likes. This is in addition to enchanting the human mind. It also has been proven to be helpful in national defense, peace and devising public and social policies. Thus Mathematical Sciences is universal in its application and appeal and hence it has become an indispensable tool to more disciplines than ever before. The society has witnessed an explosive growth in mathematical sciences based technology knowledge in the past twenty years, which (information technology) has changed the mode of thinking for all human kind, from classroom to boardroom. These changes present an unprecedented degree of challenges to consumers, educators, policy makers and scholars working in all areas of human endeavors. The Forum for Interdisciplinary Mathematics (FIM or Forum) is an international organization of scholars from various areas of mathematical sciences that is active via conferences, seminars and workshops, research publications and promoting exchange of scholars from and to India.

Brief History

The Forum is an academic society of scholars working in mathematical sciences and its partner areas (a partner area is defined as one where some knowledge of mathematical sciences is desirable to carry out research and development). The society was incepted in 1975 by a group of University of Delhi intellectuals led by Professor Bhu Dev Sharma.

Objectives

The major objectives of the 'Forum for Interdisciplinary Mathematics' (FIM) as per the deed of registration are the following:

(a) To encourage and promote the study and research in Mathematics, Science and Technology, applications of Mathematics, and areas interdisciplinary with Mathematics.

(b) To further the cause of education by providing education and carrying on researches in the field of arts, sciences, commerce, management, technology, engineering, pharmaceutical, computers, medicines, surgery, nursing, agriculture both formal and informal, academic and/or practical, and all such other modes of learning and instructions leading to award of certificates, diplomas, degrees and non-degree programmes.

(c) To give financial assistance by way of providing scholarships, books, payment of fees and other expenses to help the deserving students/fellows to continue in pursuance of higher education.

(d) Printing and/or publishing of journals, brochures, magazines, pictorial features, periodicals, books, pamphlets, posters, souvenirs, films, cassettes connected with education.

(e) Arranging and/or holding conferences, seminars, symposia, exhibitions, meetings, lectures, discussions, competitions.

(f) To provide facilities for research in the above fields of studies.

(g) To serve different organizations in the above fields as consultants.

(h) To carry out surveys in various branches relating to above activities.

Activities

In addition to Forum's own international conferences, FIM has been instrumental in sponsoring various other scholarly activities. A list follows:

Sponsored Workshops/Conferences

i. Indian Association Productivity, Quality and Reliability, Kolkata, July 2002

ii. A large workshop on "Fuzzy Sets" at Stella Maris College, Chennai, India, Workshop leader: Professor P. V. Subrahmanyam-IIT-Chennai (88 participants)

iii. A three-week Summer School in Statistical Applications, July 5-25, 2005, at the Allahabad Agricultural Institute-Deemed University (AAIDU)-Organizing Secretary-Jitendra Kumar - AAIDU (50 participants)

iv. National Conference on the History of Mathematics and Recent Developments, held in Patna, India, March 23-25, 2006

v. S. N. Roy Memorial Centenary Conference on Multivariate Statistical Methods, Kolkata, India, December 2006

vi. International Indian Statistical Association's international conference, Cochin, India, January 2007

vii. Conference at the University of North Carolina-Greensboro with ASA-NC Chapter, October 12-14, 2007

viii. National Conference on Functional Analysis, University of Jodhpur, India, Nov. 2007

Annual International Conferences

Among its current flurries of conference activities that the Forum has sponsored and continues to provide partial funds for are (its first two conferences were held in India during the decade of eighties):

1. Third International Conference at the University of Southern Maine, USA, June 1997

2. Forth International Conference at Banaras Hindu University, India, December 1997

3. Fifth International Conference at the University of Mysore, India, December 1998

4. Sixth Int. Conference at the University of South Alabama, USA, December 1999

5. Seventh International Conference at the IIT, Powai, Mumbai, India, December 2000

6. Eighth Int. Conference at the University of Wollongong, Australia, December 2001

7. Ninth International Conference at the University of Allahabad, India, December 2002
8. Tenth international Conference at the University of Southern Maine, USA, October 2003
9. Eleventh International Conference at the Institute of Engg. and Tech., Lucknow, India, December 2004
10. Twelfth International Conference at the Auburn University, USA, December 2005
11. Thirteenth Int. Conference at the Tomar Polytechnic Institute, Portugal, Sept. 2006
12. Fourteenth International Conference on Computational Mathematical and Statistical Methods at IIT-Madras, Chennai, India, January 2007
13. Fifteenth International conference at the University of Science and Technology of China-Shanghai, Institute of Advanced Studies, Shanghai, China, May 20-23, 2007
14. Sixteenth Int. Conf. at the University of Memphis, Memphis, USA, May 16-19, 2008
15. Seventeenth International Conference at the University of Western Bohemia, Plezn, Czech Republic, May 23-26, 2009

Best Paper Award to Young Researchers

Starting with the Eighth International Conference at the University of Wollongong, Australia, the Forum has started organizing and funding a symposia solely for the purpose of encouraging and awarding young researchers consisting of new Ph.D. awardees and aspirants, also known as Professor R.S. Verma Memorial Student Conference (RSVMSC). These symposia are well structured, critiqued and judged by the leading scholars from various areas of mathematical sciences, and at the conclusion of which a certificate and cash award are provided to the winners. In a very short time, RSVMSC has become popular among young researchers as FIM has appreciably realized their participation at its conferences.

Research Journals published by FIM

The Forum is currently publishing two international periodicals,

1. Journal of Combinatorics, Information and System Sciences
2. Journal of Statistics and its Applications

President

NARSINGH DEO
Millican Chair Professor, School of Computer Science,University of Central Florida,
Orlando, FL-32816, 407-823-6336, Fax 407-823-5419, deo@cs.ucf.edu

General Secretary

VIJAY K. VAISHNAVI
Professor of Computer Information Systems, Georgia State University,
Atlanta, GA 30302-4015, USA, 404-413-7381, vvaishnavi@cis.gsu.edu

Eighteenth International Conference
of
Forum for Interdisciplinary Mathematics
on
Interdisciplinary Mathematical and Statistical Techniques

August 2-4, 2009

Chief Patron

- Jaiprakash Gaur

  Founder Chairman, Jaypee Group
  Founder Pro-Chancellor, JUIT, Waknaghat

Patron

- Manoj Gaur

  Executive Chairman, Jaypee Group
  Pro-Chancellor, JUIT, Waknaghat

Conference Co-chairs

- Satya Mishra
  University of South Alabama, Mobile, AL 36688, USA
  Phone: +1 251 461 1642 Fax: +1 251 460 7969
  mishra@jaguar1.usouthal.edu
- Harinder Singh
  Jaypee University of Information Technology, Waknaghat (HP) India
  Phone: +91-1792-239207 Fax: +91-1792-245362
  harinder.singh@juit.ac.in

Conference Organizing Committee

- Satya Mishra (Chair)
  University of South Alabama, Mobile, AL 36688, USA
- Mark Carpenter
  Auburn University, USA
  carpedm@auburn.edu
- Bal Kishan Dass
  University of Delhi, India
  dassbk@rediffmail.com
- Chandra M. Gulati
  University of Wollongong, Australia
  cmg@uow.edu.au
- Bhu Dev Sharma
  Jaypee Institute of Information Technology University, Noida, India
  sharmaforum@yahoo.com

International Advisory Committee

- Chris Roger
  Auburn University, USA
  rodgec1@auburn.edu

- Petr Girg
  University of West Bohemia, Plzen, Czech Republic
  pgirg @ kma.zcu.cz

- Takakazu Sugiyama
  Chuo University, Japan takakazu@math.chuo-u.ac.jp

- Adimurthi
  TIFR, Centre for Applicable Mathematics, Bangalore, India
  aditi@math.tifrbng.res.in

- Phoolan Prasad
  Indian Institute of Science, Bangalore, India
  prasad@math.iisc.ernet.in

- Dulal Bhaumik
  University of Illinois, Chicago, Illinois, USA
  dbhaumik@uic.edu

- O.P. Singh
  Institute of Technology, Banaras Hindu University, Varanasi, India
  opsingh.apm@itbhu.ac.in

- Neeraj Misra
  Indian Institute of Technology, Kanpur, India
  neeraj@iitk.ac.in

Local Advisory Committee

- Y. Medury
  C.O.O., JES and Vice Chancellor, JUIT, Waknaghat

- T.S. Lamba
  Dean (A & R), JUIT, Waknaghat

- R.M. Vasan
  Dean, JUIT, Waknaghat

Local Organizing Committee

- Harinder Singh (Chair), harinder.singh@juit.ac.in

- Balbir Singh, balbir.singh@juit.ac.in

- Karanjeet Singh, karanjeet.singh@juit.ac.in

- R. S. Raja Durai, rsraja.durai@juit.ac.in

- Rakesh Kumar Bajaj, rakesh.bajaj@juit.ac.in

- Nitin Gupta, nitin.gupta@juit.ac.in

- **Presidential Invited Lecture**
  Quasilinear Boundary Value Problems - Theory, Numerical Experiments and Symbolic Calculations

  Petr Girg, University of West Bohemia, Plzen, Czech Republic

- **R.C. Bose Memorial Lecture**
  Computation of Hankel Transform Using Wavelets

  O.P. Singh, IT-BHU, Varanasi, India

- **Plenary Talks**

  – An Analytic Algorithm of Lane-Emden Type Equations Arising in Astrophysics Using Modified Homotopy Analysis Method
    O.P. Singh, IT-BHU, Varanasi, India

  – Semirings and Their Applications
    R.P. Sharma, H.P. University, Shimla, India

  – A Study in Coding Using Generalized Distances
    Bhu Dev Sharma, JIIT University, Noida, India

  – Estimation of Entropy and its Applications
    Neeraj Misra, IIT Kanpur, India

- **Invited Talks**

  – Beyond the Method of Infinite Descent
    Susil Kumar Jena, KIIT University, Bhubaneshwar, India

  – Exploring the Potential of Mathematics
    Rama Bhargava, IIT Roorkee, India

  – Fully Nonparametric Bayesian Analysis in Regression Model with Serially Correlated Errors
    Tanujit Dey, College of William and Mary, Williamsburg, Virginia, USA

- **Symposia**

  – Quantitative Techniques in Management
    Surender Kumar, IILM Institute for Higher Education, New Delhi, India

  – Reliability and Life Testing
    Kanchan Jain, Panjab University, Chandigarh, India

  – Algebraic Operators and Applications
    R.P. Sharma, H.P. University, Shimla, India

  – Applications of Stochastic Processes in Reliability
    Suresh Chander Malik, M.D. University, Rohtak, India

Abstracts

Presidential Invited Lecture

Quasilinear Boundary Value Problems - Theory, Numerical Experiments and Symbolic Calculations

Petr Girg
University of West Bohemia, Plzen, CZECH REPUBLIC,
pgirg@kma.zcu.cz

Boundary value problems for strongly nonlinear elliptic operators appear in mathematical models of physical systems very frequently nowadays. The existence theory for these problems has been studied since nineteen sixties with pioneering works of Pohozaev, Lions, Nečas and Fučík. In this lecture we would like to illustrate richness of this topic on a prominent example of strongly nonlinear elliptic boundary value problem – Dirichlet boundary value problem for the p-Laplacian.

In particular, we study the existence and multiplicity of solutions of the following boundary value problem

$$-\operatorname{div}\left(|\operatorname{grad} u|^{p-2}\operatorname{grad} u\right) = \lambda|u|^{p-2}u + g(x,u,\lambda) \qquad \text{in } \Omega,\ u=0 \quad \text{on } \partial\Omega,$$

where $1 < p < +\infty$, $\Omega \subset \mathbb{R}^n$ is a bounded domain. Of particular interest are values of λ near μ_1, the principal eigenvalue of

$$-\operatorname{div}(|\operatorname{grad} u|^{p-2}\operatorname{grad} u) = \lambda|u|^{p-2}u \qquad \text{in } \Omega,\ u=0 \quad \text{on } \partial\Omega.$$

We will give rough idea, how to study this problem from the point of view of the theory of bifurcations. Then we show some numerical experiments for $\Omega = (0,1)$ that motivated our theoretical results and illustrate the behavior of solutions. At the end we briefly mention how symbolical calculations can be used in dealing with problems for $\Omega = (0,1)$. The results were obtained jointly with Jiří Benedikt, Jan Čepička, Pavel Drábek, Peter Takáč and Michael Ulm.

R.C. Bose Memorial Lecture

Computation of Hankel Transform Using Wavelets

Om Prakash Singh
Institute of Technology, Banaras Hindu University, Varanasi, INDIA
opsingh.apm@itbhu.ac.in

The usefulness of wavelet analysis for problems in many applied disciplines as well as within mathematics itself tells us that there is something special about it: Wavelet analysis provides a systematic new way to represent and analyze multiscale structures. The prevalence of multiscale structures in nature and in engineering is one reason that wavelets are broadly valuable. Wavelet analysis is also a far-reaching generalization of orthogonal bases of functions whose particular new contribution is a systematic way to represent functions on unbounded domains by linear combinations of orthogonal basis functions that are compactly supported and overlapped. These are the kinds of the basis functions that are potentially realizable by physical devices. We use these orthogonal bases to obtain many new stable numerical algorithms for numerical evaluation of Hankel transform. These wavelets are used as a basis to expand a part of the integrand, $rf(r)$, appearing in the Hankel transform integral. Thus transforming the integral into a Fourier-Bessel series. Truncating the series, efficient, stable algorithms are obtained for the numerical evaluations of the Hankel transforms of order $\nu > -1$. The methods are quite accurate and stable, as illustrated by given numerical examples with varying degree of random noise terms $\varepsilon\theta_i$ added to the data function $rf(r)$, where θ_i is a uniform random variable with values in $[-1, 1]$. Finally an application of the proposed method is given in solving the heat equation in an infinite cylinder with a radiation condition.

PLENARY TALKS

An Analytic Algorithm of Lane-Emden Type Equations Arising in Astrophysics Using Modified Homotopy Analysis Method

Om Prakash Singh
Institute of Technology, Banaras Hindu University, Varanasi, INDIA
opsingh.apm@itbhu.ac.in

Lane-Emden type equation models many phenomena in mathematical physics and astrophysics. It is a non linear differential equation which describes the equilibrium density distribution in self gravitating sphere of polytropic isothermal gas, has a singularity at the

origin, and is of fundamental importance in the field of stellar structure, radiative cooling, modeling of clusters of galaxies. An efficient analytic algorithm is provided for Lane- Emden type equations using modified homotopy analysis method, which is different from other analytic techniques as it itself provides us with a convenient way to adjust convergence regions even without Pade technique. Some examples are given to show its validity.

Semirings and Their Applications

Ram Parkash Sharma
H.P. University, Summer Hill, Shimla, INDIA
rp.math.hpu@gmail.com

The group theory and ring theory play a significant role in several areas of mathematical sciences such as Practical Physics, Chemistry, Coding theory and Engineering etc. Therefore, the generalization of the results of group theory and ring theory to semirings is a very desirable feature in the domain of mathematics.Thus Semirings have been studied by the various researchers either in an attempt to broaden the techniques coming from semigroup theory or generalization of group theory and ring theory. In particular, semirings provide the most natural common generalization of the theories of rings and the most of the techniques used in analyzing semirings are taken from ring theory and group theory. Semirings first appeared implicitly in the work of R. Dedekind [1894] and later in F. S. Macaulay's work [1916], W. Krull [1924] and P. Lorenzen [1939] in connection with the study of ideals of a ring. They also appeared in D. Hilbert [1899] and E. V. Huntington [1902] in connection with the axiomatization of the natural numbers and nonnegative rational numbers. Semirings were first considered explicitly in H. S. Vandiver [1934], also in connection with the axiomatization of the arithmetic of the natural numbers. Over the years semirings have been studied by various researchers either in an attempt to broaden techniques coming from semigroup theory or generalization of group theory and ring theory or in connection with their applications. Here, we discuss semirings in view of both the points.

A Study in Coding Using Generalized Distances

Bhu Dev Sharma
Jaypee Institute of Information Technology University, Noida, INDIA
bhudev.sharma@jiit.ac.in

Distance/metrics play key role at many places in mathematics. Most mathematical studies in coding theory use Hamming distance. This greatly ignores consideration of actual error patters alone and covers capability for correction of much more than what is actually required in a given situation, resulting in greater redundancy and drop in communication rate.

Some studies have used Lee-distance, but with Hamming & Lee distances, one is constrained to use metrics that are not specially suitable in a given situation. In this paper we present a very general class of metrics, introduced by Sharma and Kaushik, which include Hamming and Lee distances as special extreme cases. The paper presents several results on bounds on parity-check digits and construction of perfect codes for generalized class of metrics.

Estimation of Entropy and its Applications

Neeraj Misra
IIT Kanpur, INDIA
neeraj@iitk.ac.in

The problem of estimating entropy of a probability distribution will be introduced and some of its applications will be discussed. The talk will consist of three parts devoted to the following three approaches:

(i) Estimation of entropy under the parametric setup of multivariate normality;

(ii) Non parametric estimation of entropy using Euclidean distances; and

(iii) Non-parametric estimation of entropy using circular distances.

INVITED TALKS

Beyond the Method of Infinite Descent

Susil Kumar Jena
KIIT University, Bhubaneswar, INDIA
susil_kumar@yahoo.co.uk

Duality is the wonder of nature. The light and darkness - both are real. If the absence of light is darkness then , the absence of darkness must be light. This is what we observe or miss to observe in our day to day world. Hence, as mathematicians, the author of this paper wants to draw your kind attention to a missing reality in mathematics. In number theory, which has many applications in different branches of science and economics, the known Method of Infinite Descent has an unknown counter-part called the Method of Infinite Ascent. That is the reason why many innocent looking number theory problems become so stub-burn to all attacks for their solutions. In this paper, we want to formally introduce this new technique and solve a couple of number theory problems for a better understanding of the inter-weaved nature around us.

Exploring the Potential of Mathematics

Rama Bhargava
IIT Roorkee, INDIA
rbharfma@iitr.ernet.in

Mathematics, in the present era have become an essential field, encroaching to almost all other disciplines, that is the reason, it has been named as “Interdisciplinary”. With the advent of fast computers, this process has become all the more penetrating, even in Social Sciences, Medical Sciences and other technical fields.

The present talk shows a glimpse of POTENTIAL of Mathematics. It will be based on a discussion on Why, Where & How. Various examples from different fields will be explained to show the versatility of its applications which will make the researchers believe that Mathematics is the ONLY science which incorporates "Earn while you learn".

Fully Nonparametric Bayesian Analysis in Regression Model with Serially Correlated Errors

Tanujit Dey
College of William and Mary, Williamsburg, Virginia, USA
tdey@wm.edu

This research encompasses the problem relates to applying nonparametric Bayesian approach in the linear regression models with serially correlated errors. Considering the linear regression problem where dependent variable is explained as a smooth function of independent variables plus some error terms of mean zero normal process. The stationarity of the error term with unknown autocovariance is assumed. The goal is to estimate the smooth function and infer about the functional relationship between independent and dependent variables; prediction of a future observation when the corresponding covariate value is known. In ordinary regression, estimated smooth function is the predicted value. However, by exploiting the dependence in the error variables, there is a gain by also estimating the error terms. Therefore, the final goal of this problem is to estimate the smooth function and error terms simultaneously.

SYMPOSIA

S1: Quantitative Techniques in Management

Dimensionality Reduction of Multivariate Data

Dilip Kumar Banerjee
Asia-Pacific Institute of Management, New Delhi, INDIA
dkb@asiapacific.edu

Multivariate analysis can often be made easier by reducing the dimensionality of the problem, expressed by the number of variables present. The technique that is typically used is the linear operation known as principal component transformation. This technique can be used only for quantitative variables and, possibly for binary variables. But in practice it is often also applied to labeled qualitative data for exploratory purposes. The method is an important starting point for studying all dimensionality reduction techniques.

The idea is to transform p statistical variables (usually correlated) in terms of $k < p$ uncorrelated linear combinations, organized according to the explained variability, classically known as Principal Component Analysis (PCA). PCA is probably the simplest way to

accomplish data reduction as it is based on linear transformations. Essentially, the obtained scores transform the original data into linear projections on the reduced space, minimizing the Euclidean distance between the coordinates in the original space and the transformed data.

This classical method (PCA) fails when presented with inherently non-linear data. Powerful geometric methods have evolved recently to handle such non-linear inputs. The talk will try to give an overview of the various methods of dimensionality reduction and looks at the advantages and disadvantages of using them.

Transient Analysis of a Queueing System with Environmental Effects and Catastrophic Effects

D. K. Kanethia
PGDAV College, University of Delhi, Delhi, INDIA
kanethia_stat_kuk@yahoo.co.in

In this paper the behavior of first-come-first-served queueing system with environmental effects and catastrophic effects is studied by using the probability generating function technique. The steady state solution of the model is also studied. Finally some particular cases are derived and discussed.

Managing the Family Planning Market in India

Sanjeev Bakshi[1] and Shailendra Kumar Mishra[2]
ISI, Kolkata, INDIA
[1]bakshisanjeev@gmail.com
[2]shailendra17@gmail.com

In this paper we have studied that how the probability of adoption of an MC by a married male/female is governed by his/her individual, socio-economic, cultural and partners' characteristics The population of married couples consists of two groups pertaining to adoption of FP. The first group consists of those couples who practice FP and the other group consists of those who do not practice FP. The later group indicates an unmet need for FP in the population. Thus, there exists an untapped market for the FP products. Reaching out to the male and the female population that still remains outside the preview of FP is a means of addressing this unmet need for FP.

The methods of contraception (MC) are either male specific or female specific. These shall be called male specific methods of contraception (MSMC) and female specific methods of contraception (FSMC) respectively. Use of condoms, withdrawal and sterilization are common MC among males in India; whereas, among females the common MC are sterilization, the use of pills and the use of IUD. Though many MC are available to males and females in the market they are adopted with different probabilities in the population. These probabilities are governed by various socio-economic and cultural characteristics; further, the role of the individual and the partners is also significant. These associations need to be estimated to address the unmet need for FP. The findings are based on a nationally representative sample of women aged 15 to 49 who participated in the third national family and health survey (NFHS) conducted during 2005-2006.

Financial Inclusion and its Impact on Urban Poverty

Nidhi Srivastava
IILM Academy of Higher Learning, Greater Noida, INDIA
nidhi_srivastava@hotmail.com

Financial inclusion means delivery of banking services and credit at an affordable cost to the vast sections of disadvantaged and low income groups. The various financial services include savings, loans, insurance, payments, remittance facilities and financial counseling/advisory services by the formal financial system. Researchers have discussed that poor living in urban areas generally face a much higher cost of living as compared to the rural population besides needing to rely on cash incomes to obtain access to shelter, food, water, sanitation, fuel etc. that is often free or cheaper in rural areas. In the above context, Financial Inclusion becomes important Policy initiative for poverty alleviation. The paper would try to assess the impact of financial inclusion policies with the help of statistical tools on the sample chosen from National Capital Region.

S2: Reliability and Life Testing

On Departure from Exponentiality when Estimating the Number of Component Processes

Anoop Dewanji
Indian Statistical Institute, Kolkata, INDIA
dewanjia@isical.ac.in

In recent past, estimating the number of component processes in a system of superimposed IID renewal processes has gained some interest with its wide ranging applications in software reliability and other areas (see, for example, Nayak, 1988, 1991; Chao et al., 1993; Dewanji et al., 1995). Formally, there are an unknown number ν of IID renewal processes each having a renewal distribution given by, say F_θ, involving parameter θ, which may be a vector. We observe only the superimposition of these ν component processes up to a prefixed time, say τ. If an event from a particular process occurs before time τ, then this process is detected and further events from this process by time τ can be identified with the process. In software reliability application, this identification is done by a mechanism known as recapture debugging (Nayak, 1988). The objective is to estimate ν based on the above observation.

Most work in this area assume Poisson processes leading to exponential distribution for the renewal time. Dewanji et al. (1995) considered a general parametric model for the renewal distribution. Keeping in mind that, in this problem, ν is the parameter of primary interest, one may be keen to know about the effect on the estimate of ν due to departure of the renewal distribution from the assumed model. Our simulation results demonstrate that violation from the exponential distribution can result in serious bias in the estimate of ν. In this work, we also suggest a simple nonparametric method for the estimation of ν, which seems to perform well in terms of bias and asymptotic normality.

Optimal Redundancy Allocations in Systems and Comparision of Component and System Level Redundancies

Neeraj Misra
IIT Kanpur, INDIA
neeraj@iitk.ac.in

In many situations, the performance of a system can be improved by attaching spare (or redundant) components to its components. In this talk, the problem of optimally allocating redundant components to the components of a coherent system to optimize its reliability or some other system characteristic will be introduced. A brief survey of the results on the problem will be carried out and some new results will be presented. Some new results on comparison of component and system level redundancies will also be presented.

Estimation of Hazard Rate after Selection from Exponential Populations

Somesh Kumar[1] and Ajaya Kumar Mahapatra[2]
IIT Kharagpur, INDIA
[1]smsh@iitkgp.ac.in
[2]ajayaiter@yahoo.co.in

Let $\pi_1; \pi_2$ be 2 populations with π_i being exponential with unknown scale parameters $\frac{1}{\lambda_i}; i = 1; 2$. Suppose independent random samples are drawn from the populations $\pi_1; \pi_2$. Let $X_{i1}; X_{i2}; \ldots; X_{in}; i = 1; \ldots; k$ be a random sample of size n drawn from the i^{th} population. Let $X_i = \sum_{j=1}^{n} X_{ij}$ be the sample mean of i^{th} population. The natural selection rule is to select the population with highest reliability. That is π_i is selected if $X_i = max(X_1; \ldots; X_k)$. We consider the problem of estimating the hazard rate function of the selected population. An admissible class of estimators is proposed. A generalized Bayes estimator is shown to be admissible with in a class of estimators. The minimaxity of this estimator is also established for $k = 2$. Further a class of scale equivariant estimator is proposed. A general inadmissibility result for the scale equivariant estimators is proved.

Multi-State System Reliability Models - Recent Trends

M. Manoharan
University of Calicut, Kerala, INDIA
mano30@rediffmail.com

In this talk we review the current developments on multi-state system (MSS) reliability Modelling. A brief history of the ideas and main directions of research in MSS reliability are given. A new class of multi-state coherent systems which includes the several existing classes are recalled here. The importance and joint importance measures of multi-state coherent systems are then explored. The current developments of various importance and joint importance measures of multi-state system are drawn up. Some illustrative examples are also provided.

Joint Reliability Importance of Series-Parallel Systems

Kanchan Jain[1] **and Isha Dewan**[2]
[1]*Panjab University, Chandigarh, INDIA*
jaink14@gmail.com
[2]*Indian Statistical Institute, New Delhi, INDIA*

Every component of a coherent system is not equally important for its functioning. Marginal Reliability Importance (MRI) of a component, the rate of change of system reliability with respect to component reliability does not give us any idea how the reliability of two or more components affect the system reliability. In practice, reliability engineers would like to improve the reliability of all those components which are critical for system functioning. The joint reliability importance (JRI) of two or more components measures the rate of change of system reliability as a function of the change in reliability of these components. The expressions for joint reliability importance of $m \geq 2$ components for a series-parallel system are discussed when components are independent but not identically distributed. The concepts of conditional marginal reliability importance and conditional joint reliability importance is explored.

S3: Algebraic Operators and Applications

Fuzzy Ideals of Group Graded Semirings

Ram Parkash Sharma[1] **and Rosy Joseph**[2]
H.P. University, Summer Hill, Shimla, INDIA
[1] rp.math.hpu@gmail.com
[2] rosy@stellamariscollege.edu.in

Research on a broad variety of applications of the theory of fuzzy sets has been growing steadily since the inception of the theory in the mid-1960s and has produced results which have applications in many areas like computer engineering, reliability theory, fuzzy control and decision making etc. On the other hand, Semirings arise naturally in many areas of mathematics such as graph theory, Euclidean geometry, commutative and noncommutative rings theory, optimization theory, automata theory, dynamical systems and parallel computation systems. Consequently, they have become an important tool in Applied Mathematics and Theoretical Computer Science. Further, the grading and group actions on semirings play an important role in Galois theory of noncommutative semirings. Therefore the interaction of Group graded semirings with the theory of fuzzy sets is a very desirable feature in the domain of fuzzy mathematics. In the absence of additive inverses in semirings, we have to impose two conditions on a G-graded semiring R:

(1) additively cancellative ($a + b = a + c \Longrightarrow b = c$), and

(2) R is assumed to be yoked (i.e. for $a, b \in R$ there exists $r \in R$ such that $a + r = b$ or $b + r = a$).

Let $R = \{(x, y)|x \in \mathbb{N},\ y = 0, 1\}$, where $\mathbb{N}$ is the set of non-negative integers. Define : $(x, y) + (x', y') = (x + x', r)$ and $(x, y).(x', y') = (xx', s)$, where $r \equiv y + y'(\text{mod}2)$ and $s \equiv xy' + yx'(\text{mod}2)$. Then $(R, +, .)$ becomes an additive cacellative and yoked semiring. Let $G = \{1, g\}$ be a group of order 2. Define $R_1 = \{(x, 0)|x \in \mathbb{N}\}$ and $R_g = \{(0, y)|y = 0, 1\}$, then R is graded by G. In this paper, we study some fundamental properties of fuzzy ideals of a group graded semiring R and characterize them in terms of its ideals. This characterization has applications in Group decision making and also enable us to settle many fuzzy ideals of R and $R\#K[G]^*$.

Prime Correspondence Between a Semiring R & its $G-$Fixed Semiring R^G

Ram Parkash Sharma[1] **and Madhu Patial**[2]
H.P. University, Summer Hill, Shimla, INDIA
[1]rp.math.hpu@gmail.com
[2]mpatial.math@gmail.com

The first mathematical structure we encounter - the set {0, 1, 2,. . . } is a semiring. Other semirings arise naturally in such diverse areas of mathematics as combinatorics, functional analysis, topology, graph theory, Euclidean geometry, Fuzzy sets, probability theory, commutative and noncommutative ring theory, optimization theory, dynamical systems, automata theory, parallel computation system and the mathematical modeling of quantum physics. From an algebraic point of view, semirings provide the most natural common generalization of the theories of rings and the most of the techniques used in analyzing semirings are taken from ring theory and group theory. Over the years, semirings have been studied by various researchers either in their own right, in an attempt to broaden techniques coming from semigroup theory or generalization of group theory and ring theory or in connection with their applications.

The study of groups acting on rings was initiated as an attempt to develop Galois theory for noncommutative rings. The theory was initially extended to division rings by N. Jacobson in 1940. The conditions in case of general noncommutative rings became complex and so a fresh approach was made by starting with some simple questions regarding the relationships of the structure of a ring R with identity to the structure of the fixed subring R^G with respect to the finite automorphism group G. A useful tool in this subject is the skew group ring $R*G$ of all formal sums $\sum_g r_g g$, $r_g \in R$, $g \in G$. In fact $R*G$ is an associative ring containing R , G and R^G, so the results of skew group rings are therefore surely of interest. In this paper, the relationships of the structure of a semiring R to the structure of the fixed subsemiring R^G and to the skew group semiring $R * G$ have been investigated through their rings of differences.

F-Compact Linear Operators on a Fuzzy Normed Linear Space

Felbin Clementina Kennedy
Stella Maris College, Chennai, INDIA
felbin2006@yahoo.co.in

The concept of a fuzzy normed linear space was introduced in an earlier paper by the author [1]. We adhere to the concepts, notions and notation in [5,6] in which the concept of a fuzzy

metric was introduced through a level sets of upper semi-continuous convex normal fuzzy real numbers is denoted by $R(I)$, I being the interval $[0,1]$ and the subset of $R(I)$ which consists of positive elements is denoted by $R^*(I)$.

The concepts of F-bounded linear operators, F-continuous operators from a fuzzy normed linear space into another was also introduced by the author in [3] and it was established that a linear operator from a finite dimensional fuzzy normed linear space into another is F- bounded. The notion of fuzzy sequential compactness was introduced and a characterization was given in the case when the space was a finite dimensional fuzzy normed linear space in [4].

In the present paper the notion of F-compactness is introduced and a characterization in the case of a finite dimensional fuzzy normed linear space is reported. The concept of F-compact operators from one fuzzy normed linear space into another is introduced and in the case when the domain or the range is finite dimensional, some of the interesting properties are reported. A necessary and sufficient condition for a linear operator from one fuzzy normed linear space into another to be an F-compact operator is established.

REFERENCES:

1 Clementina Felbin (1992),"Finite Dimensional Fuzzy Normed Linear Space", Fuzzy Sets and Systems, 48, 239-248.

2 Felbin Clementina (1993),"The F-Completion of A Fuzzy Normed Linear Space", J. Math. Anal. Appl. 174, 423-440.

3 Felbin C. Kennedy (1999),'Finite Dimensional Fuzzy Normed Linear Space II", J. Analysis 7, 117-131.

4 Felbin C. Kennedy (2008),"Finite Dimensional Fuzzy Normed Linear Space III", Journal of Combinatorics, Information and System Sciences 33, 61-74.

5 O. Kaleva and S. Seikkala,(1984),"On Fuzzy Metric Spaces", Fuzzy Sets and Systems, 12, 215-229.

6 Zadeh, L.A. (1965), "Fuzzy Sets", *Information and Control*, **8**, 338-353.

Primary Ideals in Noncommutative Semirings

Ram Parkash Sharma[1], Tilak Raj Sharma[2] and Rosy Joseph[3]

H.P. University, Summer Hill, Shimla, INDIA

[1]rp_math_hpu@yahoo.com

[2]sharmatilakraj@rocketmail.com

[3]rosy@stellamariscollege.edu.in

From an algebraic point of view, semirings provide the most natural generalizations of the theory of rings. In this paper, we generalize the ring theoretic results of [Sharma, R.P., Gupta, J.R. and Ranju Banota, Primary Ideals and Fuzzy Ideals in a Ring, South-East Asian Bulletin of Mathematics, 30, 731-744 (2006)] concerning the primary ideals and their radicals to noncommutative semirings. The derived results are further carried over to a Gel'fand semiring endowed with finite group action.

Positive Operator Method to Establish PES in Convective Stability Problems

Joginder S. Dhiman[1] **and Pushap Lata**[2]
H.P. University, Summer Hill, Shimla, INDIA
[1]jsdhiman66@gmail.com
[2]reha_dadwal@yahoo.co.in

The theoretical treatments of convective problems usually invoked the so-called principle of exchange (PES), which is demonstrated physically as convection occurring initially as a stationary convection. The PES also plays an important role in the bifurcation theory of instability. S. H. Davis [1969] proved that the eigenvalues of the linearized stability equations, as considered by Pellew and Southwell [1940], will continue to be real when considered as a suitably small perturbation of a self-adjoint problem. This was one of the first instances in which operator theory was employed in hydrodynamic stability theory. Weinberger [1969] used a method of a positive operator, a generalization of a positive matrix, to establish the PES. The basis of this method lies in the 'Krein and Rutman [1948] Theorem. Herron [2001] extended this method for establishing the PES for some convective problems. To apply the method the resolvent of the linearized stability operator, that is , is analyzed which is in the form of compositions of certain integral operators. In the present paper, our objective is to consider more general situations in convective stability problems to apply this method for the establishment of the PES.

References

Pellew, A. and Southwell, R.V. (1940), On maintained convective motion in a fluid heated from below, Proc. R. Soc., A-176, 312.

Davis, S.H. (1969), On the principle of exchange of stabilities, Proc. Roy. Soc. Ser. A., 310.

Herron, I.H. (2001), Onset of convection in a porous medium with internal heat source and variable gravity, I.J. Engg. Sci., 39, 201-208.

Krein, M.G. and Rutman M.A. (1962), Linear operators leaving invariant a cone in a Banach Space, Trans. Amer. Math. Soc., 10.

Weinberger, H.F., (1969), Exchange of stability in coquette flow, in: J.B. Keller, S. Antman (Eds.), Bifurcation Theory and Nonlinear Eigenvalue Problems, Benjamin, New York.

A Restricted Lattice on a Rough Set

R. Mohan[1] **and V. Selvan**[2]
R.K.M.Vivekananda College, Mylapore, Chennai, INDIA
[1]mohanpraba_06@yahoo.co.in
[2]venselvan@yahoo.co.in

Rough set theory (RST) is a mathematical approach proposed by Z. Pawlak in the early eighties and since it has come into focus as an alternative to the more widely used method of machine learning, Data mining and statistical data analysis. Since then several works have been done in these directions. In this paper we have defined a partial ordering relation on the set of all rough sets of a given information system. Then we gave a necessary and sufficient condition for this partial ordering relation to be a lattice.

Rough Ideals in Semirings

V. Selvan[1] and G. Senthil Kumar[2]
[1]*RKM Vivekananda College, Chennai, INDIA*
venselvan@yahoo.co.in
[2]*Dhanalakshmi college, Manimangalam, Chennai, INDIA*

In this paper we introduce the notions of rough ideals and fuzzy rough rough ideals of a semiring. We also study some basic properties of these rough ideals. We also introduce the rough prime and fuzzy rough prime ideals of a semiring and give some connections between upper and lower approximations of a semiring.

S4: Applications of Stochastic Processes in Reliability

Stochastic Analysis of a One -Unit Reliability System with No Work in Abnormal Weather Subject to Degradation

S.C. Malik[1], Jitender Kumar[2] and Jyoti Anand[3]
[1,3]*M.D. University, Rohtak, INDIA*
sc_malik@rediffmail.com
[2]*Kurukshetra University, Kurukshetra, INDIA*

This paper has been designed with an object to make stochastic analysis of a single-unit reliability system in which functioning of the unit is stopped in abnormal weather. Two reliability models are developed where the unit may fail completely either directly from normal mode or via partial failure. In model 1, the unit is repaired at its complete failure while in model 2, the repair is done at each mode of failure .The unit is considered as good as new after repair at partial failure but it becomes degraded after repair at its complete failure. The server inspects the degraded unit whenever it fails to see the feasibility of repair. If repair of the degraded unit is not feasible, it is replaced by new one. There is no effect of weather on inspection and repair of the unit. The distributions of failure time and time to change of weather conditions are taken as negative exponential while that of inspection and repair times are assumed as arbitrary with different probability density functions. The expressions for some measures of system effectiveness are derived by making use of regenerative point technique. Graphs are drawn to compare and highlight the results obtained for a particular case.

Economic Analysis of a System with Repair and Inspection Subject to Weather Conditions and Degradation

S.C. Malik[1], R.K. Bhardwaj and Jitender Kumar
M.D. University, Rohtak, INDIA

The present paper deals with a single unit system working under two weather conditions-normal and abnormal. Two reliability models are developed in which a unit may fail

completely either directly from normal mode or via partial failure. In model 1, repair of the unit is done at complete failure while in model 2, the unit is repaired both at its partial and complete failure. The unit becomes degraded after repair only at complete failure. The server inspects the degraded unit whenever it fails to see the feasibility of repair. If repair of the degraded unit is not feasible, it is replaced by new one. The repair and inspection of the unit are stopped in abnormal weather. However, system remains operative in abnormal weather. The distributions of failure time and time to change of weather conditions follow negative exponential, whereas, the distributions of inspection and repair times are taken as arbitrary. Some measures of system effectiveness are obtained by using regenerative point technique to carry out the economic analysis. Numerical results for a particular case are also calculated to compare MTSF and profit of the system models graphically.

Profit Analysis of Reliability Models with Inspection at Different Levels of Damages Subject to Degradation and No Operation in Abnormal Weather

S.C. Malik[1], J.K. Dangi and Meena Kumari
M.D. University, Rohtak, INDIA
[1]sc_malik@rediffmail.com

This paper deals with the profit analysis of two reliability models proposed for a single-unit system operating under different weather conditions introducing the concepts of inspection and degradation. The unit may fail completely either directly from normal mode or via partial failure. And, the unit is considered as degraded after repair at complete failure. There is a single-server who inspects the unit at different level of damage to see the possibility of on-line repair and feasibility of repair. If on-line repair of the unit is not possible its repair is done in down state. Again, if repair of the unit is not feasible, it is replaced by new one. The inspection and repair of the unit remain continue in abnormal weather while the functioning of the system is discontinued. The distributions of failure time and time to change in weather conditions follow negative exponential. However, the distributions of inspection and repair times are taken as arbitrary. The regenerative point technique is adopted to derive the expressions for some reliability and economic measures. The numerical results for a particular case are obtained to depict the behavior of MTSF and profit graphically.

Stochastic Analysis of a Redundant System Subject to Degradation and Priority for Operation to New Unit

S.C. Malik[1], M.S. Kadyan[2] and Jitender Kumar[3]
[1]*M.D. University, Rohtak, INDIA*
sc_malik@rediffmail.com
[2,3]*Kurukshetra University, Kurukshetra, INDIA*
[2]imukendersk@yahoo.com
[3]khatkarjitu@gmail.com

In this paper a redundant system of two identical units: one is operative and the other kept as cold standby stochastically. There is a single server who attends the system immediately whenever needed. The unit becomes degraded after repair. The server inspects the degraded unit at its failure to see the feasibility of repair. If the repair of the degraded unit is not

feasible, it is replaced by new one. The priority for operation to the new unit is given over the degraded unit. The system is considered in up-state if any of new/degraded unit is operative. The distributions of failure time of the unit are taken as negative exponential while that of inspection and repair are taken as arbitrary. The regenerative point technique is adopted to drive the expression for some reliability and economic measures. A particular case is considered to depict the behavior of some characteristics of interest graphically.

Cost-Benefit Analysis of a Redundant System with Inspection and Priority Subject to Degradation

S.C. Malik[1], M.S. Kadyan[2] and Jitender Kumar[3]
[1]*M.D. University, Rohtak, INDIA*
sc_malik@rediffmail.com
[2,3]*Kurukshetra University, Kurukshetra, INDIA*
[2]imukendersk@yahoo.com
[3]khatkarjitu@gmail.com

This paper deals with the cost-benefit analysis of a reliability model having two identical units-one is operative and the other kept as cold standby stochastically. There is a single server who attends the system immediately whenever needed. The unit becomes degraded after repair. The server inspects the degraded unit at its failure to see the feasibility of repair. If the repair of the degraded unit is not feasible, it is replaced by new one in order to avoid the unnecessary expanses of the repair. New unit get priority in operation as well as in repair over the degraded unit.The system is considered in up-state if any of new/degraded unit is operative. The distributions of failure time of the unit are taken as negative exponential while that of inspection and repair are taken as arbitrary. Various reliability measures of system effectiveness are obtained by using semi-Markov process and regenerative point technique. The behavior of MTSF, availability and cost-benefit analysis of the system have also been studied through graphs.

Analysis of a System with Maximum Operation Time and Priority for Preventive Maintenance

S.C. Malik[1], P. Nandal and M.S. Barak
M.D. University, Rohtak, INDIA
[1]sc_malik@rediffmail.com

The paper discusses two reliability models for a cold standby system in which the operating unit is shutdown after a maximum operation time for preventive maintenance. The priority is given to preventive maintenance. There is a single server who appears and disappears randomly from the system. In model I, the server can not leave the system during job while in model II, he may disappear from the system during the repair of the unit. The failure time, time of appearance and disappearance of the server are distributed exponentially, where as preventive maintenance and repair times follow arbitrary distributions. The models are analyzed in detail using regenerative point technique to obtain some reliability and economic measures. Graphs are plotted to compare MTSF and profit of the models for a particular case.

PARALLEL SESSIONS

PS1: Differential and Integral Eqautions

Orthogonal Collocation on Finite Elements and its Application in Solving Partial Differential Equations

Vijay Kumar Kukreja[1] **and Shelly Arora**[2]
[1]*Sant Longowal Institute of Engineering and Technology, Longowal, INDIA*
vkkukreja@gmail.com
[2]*Punjabi University, Patiala, INDIA*
shellyarora_25@yahoo.co.in

Orthogonal collocation on finite elements is useful for the solution of boundary value problems (BVPs) and, for a given accuracy of solution, has often been found to require less computer time than standard finite difference method. The algorithm is the conjunction of finite element method (FEM) and orthogonal collocation method (OCM). OCM discretize BVPs conveniently whereas FEM provides accuracy to the solution. The general approach is to expand the unknown solution in a series whose functional dependence on position is chosen, but which includes several adjustable parameters. These are chosen by requiring the differential equation and boundary condition to be satisfied in some specified approximate sense.

A mathematical model related to diffusion - dispersion during flow through multiparticle system is discussed. The technique of orthogonal collocation on finite elements is applied on the axial and radial domain of the system of governing partial differential equations. Effect of different parameters like axial dispersion coefficient, reaction rate kinetics, interstitial velocity, bed porosity, cake thickness, particle radius on exit solute concentration is presented. Numerical results are matching the experimental results significantly. The technique is simple, elegant and convenient for solving two point boundary value problems with no limit on the range of parameters.

Symmetric Gauss Legendre Quadrature Rules for Numerical Integration over an Arbitrary Linear Tetrahedral in Euclidean Three-dimensional Space

Nagaraja Kallur[1] **and H.T. Rathod**[2]
[1]*Amrita School of Engineering, Bangalore, INDIA*
nagarajaitec123@yahoo.com
[2]*Bangalore University, Bangalore, INDIA*

In this paper it is proposed to compute the volume integral of certain functions whose antiderivates with respect to one of the variates (say either x or y or z) is available. Then by use of the well-known Gauss Divergence Theorem, it can be shown that the volume integral of such a function is expressible as sum of four integrals over the unit triangle.

The present method can also evaluate the triple integrals of trivariate polynomials over an arbitrary tetrahedron as a special case. It is also demonstrated that certain integrals which are nonpolynomial functions of trivariates x, y, z can be computed by the proposed method. We have applied symmetric Gauss Legendre quadrature rules, which were recently derived by Rathod et al. [Gauss Legendre quadrature over a triangle, Journal Indian institute of Science, vol. 84 (2004), 183-188] to evaluate the typical integrals governed by the proposed method.

Analytical Solutions of Advection-Diffusion Equation for Varying Pulse Type Input Source in One-Dimension

Dilip Kumar Jaiswal[1] **and Atul Kumar**[2]
Banaras Hindu University, Varanasi, INDIA
[1]dilip9jais@gmail.com
[2]atul.tusaar@gmail.com

Analytical solutions have been obtained for a one-dimensional advection-diffusion equation with variable coefficients in a longitudinal domain. Two cases are considered. In the first one the solute dispersion is time dependent along a uniform flow in a semi-infinite domain while in the second case the dispersion and the velocity both have spatially dependent expressions. Analytical solutions are obtained by introducing new independent variables with the help of certain transformations.

Explicit Exact Solutions of a Non-evolution Equation

K. Singh[1] **and R.K. Gupta**[2]
[1]*Jaypee University of Information Technology, Waknaghat, INDIA*
karan_jeet@yahoo.com
[2]*Thapar University, Patiala, INDIA*
rajeshateli@gmail.com

In this paper, we study a non-evolution equation which includes the integrable Camassa-Holm and the Degasperis-Procesi equations as particular cases. By using the classical Lie method we obtain symmetries, and identify an optimal system of sub algebras with the help of which some exact solutions are deduced.

A Spectral Method for the Solution of a Fourth Order Integro-Differential Equation

Ramesh chand Mittal[1] **and Ram Jiwari**[2]
IIT Roorkee, INDIA
[1]mittalrc@gmail.com
[2]ram1maths@gmail.com

A finite element method for the solution of a fourth-order integro-differential equation was given in [3]. Error estimate in the solution for the equation was also given in [4]. In present work, a spectral method is discussed to solve the equation. The system of non - linear equations obtained by implementation is solved by an iterative method. The iterative

method is shown to converge to the solution. Utility of the method is shown by applying on three examples.

References:
[3]. J.Y. Shin, 1998, Finite element approximation of a fourth-order differential equation, Computers Math. Applic., 35(8), pp. 95-100.

[4]. M.R. Ohm , H.Y. Lee and J.Y. Shin, 2006, Error Estimates of finite-element approximations for a fourth-order differential equation, Computer and Maths with Applications, 52, pp. 283-288.

An Analytical Approach for Solving Singularly Perturbed Unsteady Burger-Huxley Equation

Deepmala Kamboj
M.L.N College, Yamuna Nagar, INDIA
sweet_mala83@yahoo.co.in

The work presented considers the initial boundary value problem for nonlinear singularly perturbed time dependent Burger- Huxley equation. Generally, the severe difficulties of two types encounter in solving this problem. The first one comes from the nonlinearity terms and the second is due to the perturbation parameter in the diffusion term. The equation contains two nonlinear terms, the cubic term and the advection term. When the perturbation parameter approaches to zero, the singular problem exhibits boundary layers and most of conventional methods fail to capture this effect.

A relatively new analytical technique called variational iteration method (VIM) is used to solve this equation. The method obtains rapidly convergent successive iterations of the exact solution without any restrictive approximations or transformations that may change the physical behaviour of the problem. A set of numerical examples are studied to demonstrate the significance and effect of various parameters involved in the equation. Further, with particular values of parameters involved, the equation reduces to other equations of great physical significance, viz., Huxley equation, Burgers equation, momentum gas and heat equation. Solutions of these equations are also discussed.

Solution of One Dimensional Heat Equation Using Galerkin Third Order B-spline FEM

Sharanjeet Dhawan[1], Sheo Kumar[2] and Saurabh Kapoor[3]
[1,2]*Dr. B.R. Ambedkar NIT Jalandhar, INDIA*
[1]sd44582@yahoo.co.in, [2]sheo53@yahoo.com
[3]*IIT Roorkee, INDIA*
saurabh09.iitr@gmail.com

In this paper numerical solution of one dimensional heat equation is obtained using Galerkin B-spline Finite Element Method (GBFEM). A B-spline FEM is based on the B-spline theory where the B-spline basis functions are used as the shape functions. In the present work a third order B-spline basis functions to determine the temperature variation in a one dimensional bar of given length has been used. Comparison of the numerical solution obtained is made with the analytical solutions for the validation purpose.

On a Nonstandard Volterra Type Dynamic Equation on Time Scale

Deepak B. Pachpatte
Dr. B.A.M. University, Aurangabad, INDIA
pachpatte@gmail.com

The aim of the present paper is to study the qualitative properties of solutions of certain nonstandard Volterra type dynamic equation on time scales. The Banach fixed point theorem and a certain dynamic inequality with explicit estimate is used to establish results.

Modified b-equations: Classical Lie Approach and Exact Solutions

R.K. Gupta[1] and Sachin Kumar[2]
Thapar University, Patiala, INDIA
[1]rajeshateli@rediffmail.com
[2]sachin1jan@yahoo.com

The Lie group formalism is applied to investigate the symmetries of the modified b-equations and some exact solutions are obtained.

Wavelet-Galerkin Solution of One-dimensional Numerical Differential Equation and Non-standard Cauchy Problem for Parabolic Heat Conduction

Vinod Mishra and Sabina[1]
Sant Longowal Institute of Engineering and Technology, Longowal, INDIA
[1]jindal.aman29@gmail.com

Gronwall inequality based technique of Mattos et al. (2003) for frequency domain and wavelet-Galerkin solution in scaling space of the Cauchy problem for heat conduction has been developed and extended to analyze non standard Cauchy problem for parabolic heat conduction with stability analysis. An effort too has been made to obtain wavelet-Galerkin solution of one-dimensional numerical differential equation $u'(t) + pu(t) = 0$ defined for $[0, 1]$, considering $u(t) \in V_{j+1}$.

Localized Relaxation and Non-standard Finite Difference Method for Hyperbolic Conservation Laws

Vivek Kumar
Jaypee Institute of Information Technology University, Noida, INDIA
vivek.kumar@jiit.ac.in

Non-standard finite difference methods (NSFDM) introduced by Mickens are interesting alternatives to the traditional finite difference and finite volume methods. When applied to linear hyperbolic conservation laws, these methods reproduce exact solutions. NSFDM

is first extended to hyperbolic systems of conservation laws, by a novel utilization of the decoupled equations using characteristic variables, and then the NSFDM is studied for its efficacy in application to non-linear scalar hyperbolic conservation laws. Some results for bench-mark problems have also been discussed.

Efficient Algorithms to Solve Singular Integral Equations of Abel Type

Rajesh Kumar Pandey
Indian Institute of Information Technology Design & Manufacturing, Jabalpur, INDIA
rajeshpbhu@gmail.com

In the present paper, we obtain the approximate solution of Abels integral equation by using the following powerful, efficient but simple methods:

(i) Hes homotopy perturbation method (HPM),

(ii) Modified homotopy perturbation method (MHPM),

(iii) Adomian decomposition method (ADM) and

(iv) Modified Adomian decomposition method (MADM).

The validity and applicability of these techniques are illustrated through various particular cases which demonstrate their efficiency and simplicity in solving these types of integral equations compared with the other existing methods.

PS2: Coding Theory and Communication

Continuum Traffic Flow Modeling Using Controlled Traffic Lights

Arvind Gupta
BITS Pilani, INDIA
arvigupta@gmail.com

We study the traffic flow controlled by traffic lights on a highway in a modified anisotropic continuum model, which is developed by Gupta and Katiyar (2005 Journal of Physics A: Math. and Gen., 38, 4069). To make the model consistent with the diverse nonlinear dynamical phenomena observed in real traffic flow, we take the sensitivity of drivers as a nonlinear function of traffic density. To investigate the single light situation and the synchronized light strategy, we carry out numerical simulations with a circular boundary condition. The spatio-temporal pattern of traffic flow is presented and the effect of traffic lights in an initially homogeneous flow is discussed. It is found that the plot of flow against density depends mainly on cycle time and the distance between the lights. The saturation of traffic flow occurs at critical density. We have shown that the value of the saturated flow depends on the cycle time of traffic lights. It is concluded that the road capacity can be optimized by adjusting the cycle time of traffic lights on a highway.

A Note on the Structure of 6-variable Bent Functions

Sugata Gangopadhyay[1] **and Deepmala Sharma**[2]
[1]*IIT Roorkee, INDIA*, gsugata@gmail.com
[2]*BITS Pilani, INDIA*, hii.deep07@gmail.com

It is proved that all 6-variable bent functions are affine equivalent to Maiorana-McFarland type bent functions.

Restrained Domination of k^{th} Power of a Cycle

T.M. Mamatha
Amrita University, Bangalore, INDIA
snehatapasvi@gmail.com

A restrained dominating set D is a subset of the vertex set of G where every vertex in $V - D$ is adjacent to a vertex in D as well as another vertex in $V - D$. The restrained domination number of a graph G is the minimum cardinality of a restrained dominating set of G. In this paper we prove that restrained domination number of square of a cycle is a ceiling function of the number $\frac{n}{5}$ and extend it to a k^{th} power of a cycle .i.e, the restrained domination number of a k^{th} power of a cycle is a ceiling function of the number $\frac{n}{2k+1}$.

Blind Time Delay Estimator for Multipath Acoustic Channel

Tarkeshwar Prasad Bhardwaj[1] **and Ravinder Nath**[2]
NIT Hamirpur, INDIA
[1]tpbhardwaj@gmail.com, [2]nath@nitham.ac.in

A new algorithm for multipath delay estimation using Autocorrelation based Estimator(AE) has been proposed. The existing AE has been modied by running a window of suitable shape and size to improve the performance. In this paper the analysis of the proposed estimator has been carried out. Different performance measures have been introduced to characterise the performance of the estimator. The estimator performance both analytical and simulated have been compared with the CRLB using these measures. Simulation results show that in the high SNR ranges the performance of the estimator has been found to be close to CRLB.

Availability Analysis for Telecommunication System

Shailja Sharma
Government Engineering College, Chandkheda, INDIA
shailza1000@yahoo.com

The author in this paper has considered a problem related to telecommunication system. In this system there are three main components namely; main-exchange, sub-exchange and Radar. The local calls are either transferred in same sub-exchange or transferred to other sub-exchange through main exchange. The S.T.D. and I.S.D. calls are distributed by

the functioning of main-exchange and Radar. On failure of Radar system, the system works in degraded state. The system can fail completely due to failure of sub-exchange, main-exchange and due to human error. All the failures are exponentially distributed whereas all the repairs follow general time distributions. Using supplementary variable techniques, Laplace transforms of various state probabilities have been evaluated. Using Abel's Lemma, steady state behaviour of system is also computed. In the last, availability of this system and numerical examples have also been given at the end to highlight the results.

On Gracefulness of Graphs Obtained from Hairy Cycles

Prabhakar Pradhan[1], **Ajay Kumar**[2] **and Debdas Mishra**[3]
[1,2]*Gurukul Kangri Vishwavidyalaya, Haridwar, INDIA*
[1]ppradhan14@gmail.com, [2]ajaygraph.gkv.math@gmail.com
[3]*C.V.Raman College of Engineering, Bhubaneshwar, INDIA*
debdasmishra@gmail.com

In this paper we give graceful labeling of the following graphs:

1. Subdivision of a cycle in hairy cycle.
2. Subdivision of the pendent edges attached to each vertex of the hairy cycle Cno1K1.
3. Joining two isomorphic copies of the hairy cycle Cno1K1 by merging each pendent vertex of one copy of Cno1K1 with the isomorphic copy of the second copy of Cno1K1.

On Non-Existence of Some $(1, 2)$-Optimal Codes

Vinod Tyagi [1] **and Navneet S. Rana**[2]
University of Delhi, Delhi, INDIA
[1]nsrana13@hotmail.com, [2]vinodtyagi@hotmail.com

In this paper we present the non existence of some $(1, 2)$-optimal codes. $(1, 2)$-Optimal codes are a class of linear codes that correct all bursts of length 1 in the first sub-block and all bursts of length 2 (fixed) in the second sub-block of a code. In many communication systems, the information is stored in various parts (sub-blocks) of the code length. Therefore we partition the code length into various sub-blocks in such a way that the pattern of errors in each sub-block is known. So, when we consider error correction in such a system, we correct errors which occur in the same sub-block. Hence the need for blockwise error correcting codes.

Construction of Equidistant Rank Metric Codes

R.S. Selvaraj[1] **and Jejaw Demamu**[2]
NIT Warangal, INDIA
[1]selvasnest@gmail.com, [2]jejaw@yahoo.com

This paper introduces a new construction for q-ary equidistant code for any metric, in particular, for codes with rank metric where q is a power of 2. Investigations on the

structural properties of the proposed code are carried out. The size of the constructed code is a power of 2. It is also shown that, if ζ is the constructed code, then $\zeta + \zeta$ is an equidistant constant-weight code. Moreover, our construction is *independent* of the choice of metric, though our investigation mainly focuses about rank metric.

PS3: Bayesian Analysis and Entropies

Bayesian Estimation of a Complex Repairable System Under Different Loss Functions

Shanku Dey
St. Anthony's College, Shillong, INDIA
sanku_dey2k2003@yahoo.co.in

In this paper, we consider a 1-out-of-N: G repairable system with an assumption that repair hazard rate increases monotonically as time parameter increases. The object of the present paper is to obtain Bayes estimator of the scale parameter and reliability function under different loss function with vague priors besides it is an increasing function. A numerical example is given.

S-entropy of Family of Statistical Probability Distribution Functions

Parmil Kumar
University of Jammu, Jammu, INDIA
parmil@yahoo.com

With the advent of Shannon's measure (1948) of entropy, a vast application has been explored of this measure as measure of randomness, concentration, diversity, uncertainty etc. in all branches of sciences and social sciences [cf. Kapur and Kesavan (1992)]. Later many a research workers have defined different forms of the entropy [cf. Mathai and Rathie (1975), Aczel and Daroczy(1963) and Taneja (2007)] but among all, Renyi's measure (1961) and Tsallis measure (1988) of entropy has sought wide attraction as extensive and non-extensive measures of information. Shafee (2007) has defined another form of entropy defined as S-entropy using the Lambert function. It turned out to be an appropriate candidate in a situation where the probability distribution does not confer to any of the previously defined forms, especially when the probability density function sought is expected to be stiffer than that resulting from maximizing the other measures of information i.e. entropies. In the present research paper, we have computed and studied the S-entropy of standard Univariate probability density function. The further application of which may be explored in next stage.

References:

Shannon, C.E. (1948), A Mathematical Theory of Communication, Bell Syst. Technology J., 27, 379-423, 623-656.

Kapur, J.N. and H.K. Kesavan (1992), Entropy Optimizaion Principles with Applications, Academic Press, New York.

Mathai, A.M. and P.N. Rathie (1975), Basic Concepts in Information Theory and Statistics,

Wiley Eastern Ltd., New Delhi.
Renyi, A. (1961), On Measures of Entropy and Information, Proc. 4^{th} Berk. Symp. Math. Statist. and Probl., University of California Press, Vol. 1, 547-461.
Aczel, J.D. and Daroczy, Z. (1963). Uber Verallegmeinerte quasilineare Mittelwerte die mit Gewichtsfunktionnen Gebildet sind, Publications mathematicae, 10, 171-190.
Shafee, F. (2007). Lambert Function and A New Non-extensive form of Entropy, IMA Journal of Applied Math, 72, 785-800.
Taneja, I.J. (1989). On Generalized Information Measures and Applications, Adv. Elec. Elect. Phy., 76, 327-413.
Tsallis, C. (1988). Possible generalization of BoltzmannGibbs statistics published in the Journal of Statistical Physics, vol. 52, pp. 479 487.

Two New Generalized Information Theoretic Measures Based Upon Probability Distributions

Om Parkash[1] **and C.P. Gandhi**[2]
[1]*Guru Nanak Dev University, Amritsar, INDIA*
omparkash777@yahoo.co.in
[2]*Rayat & Bahra Institute of Engineering and Biotechnology, Mohali, INDIA*
cchanderr@gmail.com

Uncertainty is an attribute of information and the theory of uncertainty has profound intersections with the emerging fields of Mathematical Sciences. Moreover, this theory has led to a universal acceptance that information is statistical in nature. In this communication, keeping the above idea into consideration, we have proposed two new generalized parametric information measures for a probability distribution. To prove the authenticity of these measures, we have studied their essential and desirable properties. Moreover, the newly introduced measures of entropy have been presented graphically and interesting conclusions have been made.

Bayes Estimation of Reliability Function of Classical Pareto Distribution Under General Entropy Loss Function

Ashutosh Shukla[1] **and B.P. Singh**[2]
Banaras Hindu University, Varanasi, INDIA
[1] ashutoshshukla20@gmail.com
[2]bpsinghbhu@gmail.com

This paper deals with the Bayes estimation of life time parameters such as reliability function of Classical Pareto distribution under General entropy loss (GEL) function when scale parameter known. General Entropy Loss (GEL) function is an asymmetric loss function which may be used in a situation where overestimation of the parameter does not produce same consequence as compared to the equal magnitude of under estimation. The estimator is derived using the conjugate prior for the shape parameter of this model. The properties of Bayes estimator in respect of risk have been studied and it is found that the asymmetric (general entropy) loss estimator is preferable to the symmetric (squared error) loss estimator in some situations.

Bayesian Unit Root Testing of Exchange Rates Using AR(1) Model with Partial Time Trend

Jitendra Kumar[1], Ashutosh Shukla[2] and Anoop Chaturvedi[3]
[1,2] *Allahabad Agriculture Institute-Deemed University, Allahabad, INDIA*
[1] jitendra_20932@rediffmail.com
[2] ashutoshstats@gmail.com
[3] *University of Allahabad, Allahabad, INDIA* anoopchaturv@gmail.com

In the present paper we study the stationarity of exchange rates using the autoregressive time series model having partial linear time trend. The posterior odds ratio is obtained under appropriate prior assumptions. The unit root hypothesis is tested for exchange rate in reference of Canadian dollar of monthly series data from April 2004 to March 2009 provided by bank of Canada. On the basis of posterior odds ratio it has been observed that if non-linear function is a divergent function then unit root hypothesis is rejected but posterior odds ratios are too small. However, if function converges to zero then in some of the series unit root hypothesis are accepted and in some other, rejected. Further if the function converges to one then hypothesis is rejected and value of posterior odds ratio is higher in comparison to the other cases.

The Frontrier Production Model: Bayesian Approach

Shalini Masih[1] and Ram Lal
Allahabad Agricultural Institute, Allahabad (INDIA) ,
[1] shalini_kanchanmasih@rediffmail.com

In this paper the Bayesian analysis of the Frontrier Production Model:

$$Y_t = \alpha + \beta_1 X_{t_1} + \beta_2 X_{t_2} + \ldots + \beta_p X_{t_p} - E_t$$

has been carried out when the underlined regression disturbances are not normal. Suitable prior densities have been assumed for the parameters involved in the model and the squared error loss function is considered. The Posterior covariance matrices between the regression coefficients have also been obtained.

Bayesian Analysis of Simple Linear Econometric Model on the Natural Parameter Space

Ram Lal and Anupriya Paul[1]
Allahabad Agriculture Institute-Deemed University, Allahabad, INDIA
[1] alpana_priya29@yahoo.co.in

In this paper we have considered simple linear econometric model specified by the equation:

$$y = x\beta + u \tag{1}$$

Where $y' = (y_1, y_2, \ldots, y_n)$ is a point in $\mathbb{R}^n$ and represents observations on an endogenous variable, $x' = (x_1, x_2, \ldots, x_n)$ is a vector of observations on an exogenous variable, β is an unknown slope and $u' = (u_1, u_2, \ldots, u_n)$ is a vector of independent identically distributed normal random disturbances with zero means and common variance σ^2. The unknown parameter β have been estimated here in a Bayesian frame work assuming the squared error loss function and a suitable prior density on the parameter space of (β, σ).

PS4: Networks and software Testing

An Optimal Path Programming Algorithm in Wireless Ad-hoc Networks under Complex Environment

Sandip Vijay[1] **and S.C. Sharma**[2]
Wireless Computing Research Lab., Electronics & Computer Discipline, DPT
IIT Roorkee, INDIA
[1]vijaysandip@gmail.com
[2]scs60fpt@iitr.ernet.in

This paper discusses a new algorithm of optimal path programming in Wireless Ad-hoc Networks under complex environment. It firstly introduces the basic theories of path programming and some concepts of graph theory, then lays stress on the study of Dijkstra algorithm in the shortest path problem, and describes the process of its realization in detail. In the end, example analysis and simulation results are given.

Threshold Signature Cryptography Scheme in Wireless Ad-hoc Computing

Sandip Vijay[1] **and S.C. Sharma**[2]
Wireless Computing Research Lab., Electronics & Computer Discipline, DPT
IIT Roorkee, INDIA
[1]vijaysandip@gmail.com
[2]scs60fpt@iitr.ernet.in

Identity-based systems have the property that a user's public key can be easily calculated from his identity by a publicly available function. The bilinear pairings, especially Tate pairings, have high performance in cryptography. With the foundation of above two properties, we have proposed a new ID-Based (t, n) threshold signature scheme from Tate pairings. The scheme is proved secure that it can resist attacks including plaintext attack, recovery equation attack, conspiracy attack and impersonation attack. Furthermore, performance analysis shows that the proposed scheme is simple, efficient so that it will be suitable for an environment of finite bandwidth and low capability equipment.

Test Process Model with Enhanced Approach of State Variable

Praveen Ranjan Srivastava
BITS Pilani, Rajasthan, INDIA
praveenr@bits-pilani.ac.in

Software release is highly dependent upon the quality of the product which must be met by the product before release. Software product quality outcome will be good if modeling of test process is good. There are large numbers of state variables exist which can affect the software testing process. In this paper we introduce various state variables for improving the software test process. By introducing as many state variables as we can, definitely we

can enhance the overall quality of testing process and which ultimately will enhance the quality of software product. In software testing process feedback system also play very important role to improve the overall quality. This paper proposes an algorithm focus upon the use of the state variables along with the control based system for the software testing process. Combine concept of controls based system and state variables provide the power of identifying the remaining number of errors at any point of time. Proposed algorithm uses the concept of the feedback system and related work [9][10][12][13] with additional state variables to model an efficient software testing process.

References:

[9] R.A. Decalo "Linear system: A state variable approach with numerical implementation", Upper Saddle River, NewYork, Apprentice Hall, 1989.

[10] Cangussu, J. W. DeCarlo R.A. and Mathur A.P, "A state variable model for the software test process", Proc. 13 International Conference on Software & Systems Engineering and their Applications, December 5-8, Vol. 2, 2000.

[12] J. W. Cangussu, R. A. DeCarlo, and A. P. Mathur, "A formal model for the software test process", IEEE Transaction on Software Engineering, Vol. 28, pp. 782796, August 2002.

[13] Aditya P. Mathur, anandsJo ao W. Cangussu "Effect of Disturbances on the Convergence of Failure Intensity", Proceedings of the 13^{th} International Symposium on Software Reliability Engineering, IEEE Computer Society, Washington DC, USA , pp. 377, ISBN:0-8186-1763-3, 2002.

Multi-attribute Comparison of Automated Functional and Regression Testing Tools Using Fuzzy AHP

Praveen Ranjan Srivastava
BITS Pilani, INDIA
praveenr@bits-pilani.ac.in

Software Testing is a process used to help in improving quality and efficiency of a software product. In order to make the testing process less time consuming and efficient Automated Testing Tools are being used. The correct choice of an automated testing tool is a critical success factor for the developed product to reach and maintain market leadership. In the current paper a model for selecting an automated functional and regression testing tool using the Fuzzy Analytical Hierarchy Process (FAHP) is presented. The FAHP is used to compare the Testing Tools. The means of the triangular Fuzzy numbers produced by the experts from different CMM level 5 organizations were successfully used in the pair-wise comparison matrix.

Test Case Minimization and Prioritization Using CMIMX Technique

Praveen Ranjan Srivastava
BITS Pilani, INDIA
praveenr@bits-pilani.ac.in

Test case prioritization techniques schedule test cases for execution in an order that attempts to increase their effectiveness at meeting some performance goal. Various goals are possible; one involves rate of fault detection i.e. the measure of how quickly faults are detected within

the testing process. To improve the performance of regression testing two objectives to be achieved. i.e test case minimization and test case prioritization. In this paper both the processes are considered along with special care has given to the data dependencies within the source code. So, path coverage is taken, which proves better option than the previous methods adopted.

An Approach of Optimal Path Generation using Ant Colony Optimization

Praveen Ranjan Srivastava[1] **and Baby P.**[2]
BITS Pilani, INDIA
[1]praveenr@bits-pilani.ac.in
[2]baby2002dc@gmail.com

Software Testing is one of the most indispensable parts of software development lifecycle and Structural testing is one of the most widely used testing paradigms for testing various software. Structural testing relies on code path identification, which in turn leads to identification of effective paths. The current paper aims at presenting a simple and novel algorithm using an ant colony optimization, for the effective/optimal path identification by using the basic property and behavior of the ants. This novel approach uses certain set of rules to find out all the effective/optimal paths via ant colony optimization (AC0) principal. The method concentrates on generation of paths, equal to the cyclomatic complexity. This algorithm guaranteed automated and fully coverage path based coverage.

Metrics Evaluation for Schemes for Energy and Security Features in Ad Hoc Networks

Ashwani Kush[1] **and Sunil Taneja**[2]
[1]*Kurukshetra University, Kurukshetra, INDIA*
akush20@gmail.com
[2]*Government P.G. College, Kalka, INDIA*
suniltaneja.iitd@gmail.com

A recent trend in Ad Hoc network routing is the reactive on-demand philosophy where routes are established only when required. Most of the protocols in this category are not incorporating proper security features. In this paper some areas have been identified where work needs to be done to incorporate security mechanisms into the routing protocols for ad hoc networks. The ad hoc environment is accessible to both legitimate network users and malicious attackers. It has been further observed that Energy factor has not been utilized efficiently by the Routing schemes. It has been observed that different protocols need different strategies for security. The paper is an insight into the existing schemes for Security and Energy awareness. Its aim is to provide the standardizing metrics for selection of routing schemes for ad hoc networks. The study will help in making protocol more robust against attacks and standardizing parameters for security and energy efficiency in routing protocols.

Evaluation of Power Aware Routing Scheme Metrics in Ad Hoc Networks

Ashwani Kush[1] **and Divya Sharma**[2]
University College, Kurukshetra University, Kurukshetra, INDIA
[1]akush20@gmail.com
ITM College, Gurgaon, INDIA
[2]divya@itmindia.edu

A recent trend in ad hoc network routing is the reactive on-demand philosophy where routes are established only when required. Most of the protocols in this category, however, use single route and do not utilize multiple alternate paths. Major hurdle in communication via Ad hoc networks is their power limitations. As most of them uses battery power and also are moving so there is always limitation of battery power. This paper carries out a study of existing metrics used in Power aware schemes in Ad hoc networks and proposes a generalized solution to the problem.

On Study, Comparison and Implementation of Fuzzy Algorithm on Iris Data Set

Kaushal Kishore Sharma[1]**, Rakesh Kr Bajaj**[2] **and Ravindara Bhatt**[3]
Jaypee University of Information Technology, Waknaghat, Solan, INDIA
[1] kaushal.vickyin@gmail.com
[2] rakesh.bajaj@juit.ac.in
[3] ravibhatt2@rediffmail.com

Data mining functionalities are used to specify the kind of patterns to be found in data mining tasks. Considering Fisher's Iris data set which is multivariate data set, the present paper discusses K-means algorithm, Park's Method of clustering and Fuzzy c-means algorithm of clustering. Further, the discussion and comparison among the results obtained by these algorithms with implementation of Fuzzy c-means algorithm under different distance norms have been done.

PS5: Mathematical Analysis

Analytic Vector Field on an Almost Hyperbolic Hermitian Manifold

Sushil Shukla
Invertis Institute of Engineering and Technology, Bareilly, INDIA
complex_geometry@yahoo.co.in

Y. Matsushima proved that in a compact Kähler-Einstein space, any contravariant analytic vector field is uniquely decomposed in the form of Killing vector fields. A. Lichnerowicz generalised this result for a compact Kähler manifold with constant scalar curvature. S. Sawaki generalised the same result for a compact almost Tachibana-Einstein manifold. In

1959, Tachibana introduced the concept of an almost analytic vector field in the almost complex spaces.

The aim of the paper is to discuss an analytic vector field on an almost hyperbolic Hermitian manifold and to obtain certain expressions of the curvature tensor on an almost hyperbolic Hermitian manifold admitting semi-symmetric metric connection assuming analytic vector field to be killing and affine.

Inclusion Properties of a Subclass of Analytic Functions Defined by a Certain Integral Operator

Shamkant Khairnar[1] **and Meena More**[2]
Maharashtra Academy of Engineering, Alandi, Pune, INDIA
[1]smkhairnar2007@gmail.com
[2]meenamores@gmail.com

In the present paper we introduce a new subclass of analytic functions in the unit disc defined by convolution $(f_\mu)^{-1} * f(z)$, where

$$f_\mu = (1-\mu)z\,{}_2F_1(a,b;c;z) + \mu z(z\,{}_2F_1(a,b;c;z))'.$$

Several interesting properties of the class and integral preserving properties of the subclasses are also considered.

Relational Topology

Ratna Dev Sarma
Rajdhani College, Delhi, INDIA
ratna_sarma@yahoo.com

Relational topology, based on relation between points and sets, are defined and studied. Dislocated metrics, used in Logic Programming, generate dislocated topologies which are examples of relational topology. Various aspects of dislocated topologies are investigated. Compactness and completeness of dislocated spaces are studied. Cantor's Intersection property is shown to be valid for dislocated topological spaces.

Properties of a Class of Analytic and Univalent Functions Associated with Convolution Structure of Complex Order

Shamkant Khairnar[1] **and Meena More**[2]
Maharashtra Academy of Engineering, Alandi, Pune, INDIA
[1]smkhairnar2007@gmail.com
[2]meenamores@gmail.com

We introduce a new subclass of analytic and univalent functions of complex order, $K_n(\gamma,\beta,\eta)$ defined by convolution of $S_\beta(z) = \frac{z}{(1-z)^{2(1-\beta)}}, (0 \leq \beta < 1)$ and the Dziok-Srivastava linear operator $(H_s^q[a_1]f)(z)$. We prove inclusion relations associated with the (n,δ)-neighbourhoods for the subclass. Special cases of some of the results are shown to yield

known results by other authors. Some more results like modified Hadamard product, growth and distortion theorems, radius of starlikeness, convexity and close-to-convexity, extreme points, closure theorems, inclusion properties, and other interesting consequences are also discussed.

New Insight into Wavelets

Pammy Manchanda[1] **and Meenakshi**[2]
[1]*Guru Nank Dev University, Amritsar, INDIA*
pmanch2k1@yahoo.co.in
[2]*Dev Samaj College for Women, Ferozepur, INDIA*
meenakshi_wavelets@yahoo.com

Wavelet analysis is a refinement of Fourier analysis and has been applied in diverse fields of science and technology. We have introduced the concept of Haar-Vilenkin wavelet and some special type of non-uniform multiresolution analysis. Haar-Vilenkin wavelet is a generalization of Haar wavelet which is a simplest example of wavelet introduced by Hungarian mathematician Alfred Haar in 1909 while a special class of non-uniform multiresolution analysis is a generalization of the classical multiresolution analysis.

In this paper we investigate the results concerning orthogonality of Haar-Vilenkin wavelet, convergence of Haar-Vilenkin wavelet series, properties of Haar-Vilenkin wavelet coefficients and the properties of special non-uniform multiresolution analysis. More precisely we extend these results on $\mathbb{R}_+$ (the set of positive real numbers).

Warped Product Semi-Slant Submanifold of T-Manifold

Meraj Ali Khan[1] **and Khushwant Chahil**[2]
Thapar University, Patiala, INDIA
[1]meraj79@gmail.com
[2]khushwantchahil@gmail.com

The purpose of the present paper is to study warped and doubly warped product semi-slant submanifold of T-manifold.

Non-Existence, Block Structure Properties and Applications of NML_i and Pseudo $\text{NML}_m{}^{(m)}$ Type Designs

Davinder Kumar Garg
Punjabi University, Patiala, INDIA
dkgarg_stat@yahoo.co.in

New modified latin square (NML_i) and Pseudo new modified latin square Pseudo ($\text{NML}_m{}^{(m)}$) type partially balanced incomplete block (PBIB) designs were introduced by Garg (2008, 2009) respectively along with methods of construction and analysis of such designs. In this paper, some non-existent NML_i type PBIB designs has been listed. Block structure properties of NML_i and Pseudo $\text{NML}_m{}^{(m)}$ type designs along with some applications of such

designs as symmetrical factorial experiments and confounded m^2 experiments respectively have also been discussed in brief.

References:
Garg, D.K. (2008): New Modified Latin Square (NML_i) Type PBIB Designs. Inte. Journal of Mathematics and System Sciences, 4, No. 1, pp. 83-89.
Garg, D.K. (2009): Pseudo ${NML_m}^{(m)}$ Type PBIB Designs. Submitted after m revision to Communication in Statistics-Theory and Methods, USA.

Common Fixed Point Theorem in 2-Metric Space Using a Contractive Condition of Integral Type

Vishal Gupta[1] and R.K. Saini[2]
[1] *M.M.University, Mullana, Ambala, INDIA*
vishal.gmn@gmail.com
[2] *D.A.V. College, Muzaffernagar, INDIA*
rksaini03@yahoo.com

In this paper we prove a common fixed point theorem in 2-Metric space using reciprocal continuity satisfying a Contractive Condition of Integral Type, which properly generalized the theorem of Rhoades, Pant and Som. Our result extend and generalized several theorems on metric space, probabilistic metric space and 2-Metric space.

Integrability and Convergence of Double Sine Series

Jatinderdeep Kaur[1] and S.S. Bhatia[2]
Thapar University, Patiala, INDIA
[1] jatinkaur4u@yahoo.co.in
[2] ssbhatia63@yahoo.com

We study double sine series with special coefficient of sequences. We are mainly concerned with the following problems:

(i) the series in the question is point-wise convergent

(ii) the sum of the series is integrable

(iii) the series is the fourier series of its sum.

A Fixed Point Theorem in Fuzzy 3-Metric Space

R.K. Saini[1] and Vishal Gupta[2]
[1] *D.A.V. College, Muzaffernagar, INDIA*
rksaini03@yahoo.com
[2] *M.M.University Mullana, Ambala, INDIA*
vishal.gmn@gmail.com

In this paper, we prove a common fixed point theorem in fuzzy 3-Metric space using reciprocal continuity, which properly generalized the theorem of Roades, Pant and Som. Our result extends, generalized and fuzzifies several theorems on metric space, probabilistic metric space and fuzzy metric space.

Convergence Behavior of Generalized Newton Methods Under Weaker Lipschitz Condition

V. Antony Vijesh
Indian Institute of Space Science and Technology, Thiruvananthapuram, INDIA
antonyvijesh@gmail.com

In this paper we prove a local convergence theorem of generalized inexact Newton method and Newton-like method for the operator equation $F(x)+G(x) = 0$, where F is the Gateaux differentiable continuous operator while the operator G satisfies a Lipschitz condition on an open convex subset of a Banach space. As corollaries, recent theorems of J. Chen and W. Li published in year 2006 are deduced. Illustrative examples are also provided.

Conversion of Imperative Sentences from Active to Passive Voice by Topological Homeomorphism

Rakesh Pandey[1] and H. S. Dhami
University of Kumaun, Almora, INDIA
[1]rakesh_pandey2003@yahoo.com

In our this present study we have applied properties of topological spaces, bases, sub-bases, continuous mappings and homeomorphism of abstract algebra for transformation of imperative sentences from active to passive voice by taking elements of the English language.

PS6: Fluid Dynamics

A Finite Element Study of Natural Convection of Nanofluids in an Enclosure

Sapna Sharma
BITS Pilani, INDIA
sapna2002@gmail.com

In this paper, we study the heat transfer and fluid flow due to buoyancy force in a square enclosure using nanofluids. The solid particle dispersion has been taken to analyze the heat transfer performance of nanofluids. The natural convection heat transfer effects due to uncertainties in effective dynamic viscosity and thermal conductivity of nanofluid are also discussed. Four different types of model from the literature are considered for the effective dynamic viscosity of the nanofluid. Finite Element method has been applied to incorporate a homogeneous solid-liquid mixture formulation for the two-dimensional buoyancy-driven convection in the enclosure filled with three different types of nanofluids e.g. Al_2O_3, Cu and TiO_2. Simulations have been carried out to investigate the effects of the volume fraction, Nusselt number and Grashof number. An increase in Nusselt number was found with the volume fraction of nanoparticles for the whole range of Grashof number. Other than the thermal conductivity, the effective dynamic viscosity found to play a major role in heat transfer enhancement as the significant difference is observed from different adopted models. Finally, it has been shown that the ratio of the heat transfer coefficient of nanofluids to that of base fluid is decreased as the size of the nanoparticles increases.

Thermal Convection Of Micropolar Fluids In The Presence Of Suspended Particles In Hydromagnetics

Veena Sharma[1] **and Sumit Gupta**[2]
H.P. University, Summer Hill, Shimla, INDIA
[1]veena_math_hpu@yahoo.com
[2]sumitttgupta@gmail.com

The onset of instability is investigated in a micropolar fluid layer heated from below in the presence of suspended particles (fine dust) and uniform vertical magnetic field $\vec{H}(0,0,H)$. Using the Boussinesq approximation, the linearized stability theory and normal mode analysis method, the exact solutions are obtained for the case of two free boundaries. It is found that the presence of coupling between thermal and micropolar effects, the suspended particles number density, the magnetic field intensity and the micropolar coefficients bring oscillatory modes and overstability in the system which were non-existent in their absence. The behaviour of the Rayleigh numbers for the stationary convection and the case of overstability have been computed numerically using Newton- Raphson method through the software Fortran-90 and Mathcad by giving permissible values for the respective parameters, which are in good agreement with the corresponding values used by Chandrasekhar [(1981) Hydrodynamic and Hydromagnetic Stability. New York], while describing various hydrodynamic and hydromagnetic stability problems. The graphs show that Rayleigh number for the case of overstability and stationary convection increase with increase in magnetic field intensity $\vec{H}(0,0,H)$ and decrease with increase in micropolar coefficients viz. the dynamic microrotation viscosity and coefficient of angular viscosity γ', for a fixed wave- number, implying thereby the stabilizing effect of magnetic field intensity and destabilizing effect of micropolar coefficients on the thermal convection of micropolar fluids. Thus there is a competition between the stabilizing effect of magnetic field intensity and destabilizing effect of micropolar coefficients and the suspended particles number density. It is also found from the graphs that the Rayleigh number for the case of overstability is always less than the Rayleigh number for the case of stationary convection, for a fixed wave number; however, the reverse has occurred for large wave-numbers.

Stability of Stratified Elastico-Viscous Walters'(Model B') Fluid in the Presence of Horizontal Magnetic Field and Rotation

Veena Sharma[1]**, Sanjeev Kumar**[2] **and Suneel**[3]
[1]*H.P. University, Summer Hill, Shimla, INDIA* veena_math_hpu@yahoo.com
[2]*Govt. College, Mandi, INDIA* sanjeev.gcm@gmail.com
[3]*Govt. Senior Secondary School, Joginder Nagar, INDIA* sanjeev.gcm@gmail.com

The influence of viscosity and viscoelasticity on the stability of a stratified elastic-viscous fluid is examined for viscoelastic polymeric solutions in the simultaneous presence of a uniform horizontal magnetic field $H(H,0,0)$ and uniform horizontal rotation $\Omega(\Omega,0,0)$. These solutions are known as Walters'(model B') fluids and their rheology is approximated by the Walters'(model B') constitutive relations, proposed by Walters'.The effects of coriolis force on the stability are chosen along the direction of the magnetic field and transverse to that of the gravitational field $g(0,0,-g)$. Assuming the exponential stratifications in density, viscosity and viscoelasticity, the appropriate solution for the case of free boundaries is obtained

using a linearized stability theory and normal mode analysis method. The dispersion relation is obtained and the behaviour of growth rates with respect to kinematic viscosity and kinematic viscoelasticity is examined numerically using Newton-Raphson method through the software Fortran 95. In contrast to the Newtonian fluids, the system is found to be unstable, for stable stratifications, for small wavelength perturbations. It is found that the magnetic field stabilizes the certain wave number band, for unstable stratification in the presence of rotation and this wave number range increases with the increase in magnetic field and decreases with the increase in kinematic viscoelasticity implying thereby the stabilizing effect of magnetic field and kinematic viscoelasticity and the kinematic viscosity has a stabilizing effect on the system for the low wave number range. These results are shown graphically.

A Nonlinear Stability Analysis of a Magnetized Ferrofluid Heated from Below in Presence of Suspended Particles

Virendra Kumar[1] and Y.D. Sharma[2]
NIT Hamirpur, INDIA
[1]vmathnith2008@gmail.com
[2]yds@nitham.ac.in

A nonlinear (energy) stability analysis is performed for a magnetized ferrofluid layer heated from below in the presence of suspended particles, in the stress-free boundary case. By introducing a generalized energy functional, a rigorous nonlinear stability result for a thermoconvective magnetized ferrofluid is derived. The mathematical emphasis is on how to control the nonlinear terms caused by magnetic body and inertia forces.

Surface Tension Driven Instability in a Relatively Hotter or Cooler Liquid Layer With Free Boundaries

Anil K Gupta[1] and R.G. Shandil[2]
H.P. University, Summer Hill, Shimla, INDIA
[1]guptakdr@gmail.com
[2]shandil_rg1@rediffmail.com

In this paper, we study the onset of cellular convection in a horizontal fluid layer heated from below, with free-slip boundary condition at bottom when the driving mechanism is surface tension at the upper free surface, in the light of the extended argument of Banerjee et al. [Jour. Math. & Phys. Sci., 1983, 17, 603]. This leads to a formulation of the problem which depends upon whether the liquid layer is relatively hotter or cooler. Numerical results are obtained for the problem wherein the lower free boundary is thermally conducting. The results obtained are found to be significant from qualitative as well as quantitative points of view. It is found that the phenomenon of surface tension driven instability problems should not only depend upon Marangoni number which is proportional to the maintained temperature differences across the layer but also upon another parameter that arises due to variation in the specific heat at constant volume on account of the variations in temperature, which makes a provision in the theory so as to recognize the fact that a relatively hotter layer with its heat diffusivity apparently increased/decreased as a consequence of an actual decrease/increase (depending upon the liquid) in its specific heat at constant volume must

exhibit convection of the type observed by Bénard [Revue générale des Sciences pures et appliqués. 1900, 11, 1261] at a higher/lower Marangoni number than a cooler layer under almost identical conditions otherwise. The discussion in this paper is restricted to the case when instability sets in as stationary convection.

Double-Diffusive Convection of Micropolar Fluid with Hall Effects

Neela Rani[1] **and S.K. Tomar**[2]
[1]*MCM DAV College, Chandigarh , INDIA*
neela.pawar@yahoo.com
[2]*Panjab University, Chandigarh, INDIA*
sktomar@pu.ac.in

Thermal instability of a micropolar fluid layer soluted and heated from below in the presence of hall currents is investigated. Using the appropriate boundary conditions on the boundary surfaces of the fluid layer, the frequency equation is derived and then critical Rayleigh number is determined. It is found that hall current parameter has destabilizing effect, while salinity has stabilizing effect on the system. The variation of Rayleigh number with wave number is computed and depicted graphically for different values of various parameters. The results of some earlier workers have been recovered from the present formulation.

Instability of Two Rotating Maxwellian Viscoelastic Superposed Fluids with Variable Magnetic Field in Porous Medium

Amandeep Singh[1]**, Mahinder Singh and Harpreet Kaur**
Lovely Professional University, Phagwara, INDIA
[1]amansidhu_b@yahoo.com

The instability of the plane interface between two Maxwellian viscoelasic superposed fluids in the presence of uniform rotation and variable magnetic field in porous medium is considered. For potentially stable configuration, the system is found to be stable for disturbances of all wave numbers. The magnetic field succeeds in stabilizing certain wave-number range, which were unstable in the absence of magnetic field and rotation for the potentially unstable configuration. Sub cases of magnetic free and rotation free configurations are also considered, separately.

Effect of Rotation and Magnetic Field on Thermal Convection in a Compressible Walters' (Model B') Fluid Permeated with Suspended Particles

Amrish Aggarwal[1] **and Anushri Verma**[2]
[1]*Jaypee Institute of Information Technology University, Noida, INDIA*
amrish.aggarwal@jiit.ac.in
[2]*J.S.S Academy of Technical Education, Noida, INDIA*
anushri_verma@rediffmail.com

A layer of compressible, electrically conducting Walters' (model B') elastico-viscous fluid permeated with suspended particles heated from below in the presence of magnetic field

and rotation is considered. For the case of stationary convection, the Walters' (model B') elastico-viscous fluid behaves like a Newtonian fluid and the compressibility, magnetic field and rotation are found to have stabilizing effect whereas suspended particles have a destabilizing effect on the system. The presence of each visco-elasticity, magnetic field, suspended particles and rotation introduces oscillatory modes in to the systems which were non-existent in their absence.

MHD Heat and Mass Transfer Free Convection Flow Near the Lower Stagnation Point of a Porous Isothermal Cylinder in Presence of Radiation

Ziya Uddin[1] **and Manoj Kumar**[2]
G.B. Pant University of Agriculture and Technology, Pantnagar, INDIA
[1]ziya_dd@rediffmail.com
[2]mnj_kumar2004@yahoo.com

Heat and mass transfer characteristics and the flow behavior on MHD flow near the lower stagnation point of a porous isothermal horizontal circular cylinder have been studied. The equations of conservation of mass, momentum, energy and concentration which govern the case study of heat and mass transfer flow have been obtained. These equations have been transformed into a system of non-dimensional coupled non-linear ordinary differential equations by using similarity transformations and finally solved by Runge-Kutta and shooting method. It has been assumed that the fluid is incompressible, absorbing-emitting radiation and viscous, with temperature dependent viscosity and temperature dependent thermal conductivity in the presence of radiation. Velocity profiles, temperature distributions and concentration distributions for the flow have been presented for various values of radiation parameter, viscosity variation parameter, thermal conductivity variation parameter, Prandtl number and Schmidt number. The skin friction factor, local Nusselt number and Sherwood number are also calculated for all the parameters involved in the problem.

It has been observed that with the increase in Schmidt number skin friction and Nusselt number decrease, while Sherwood number increases.

PS7: Stochastic and Availability Analysis - Applications

Stochastic Behavior of Sugar Plant with 2-out-of-3: F Boilers and Pre-emptive Resume Repair

Deepankar Sharma[1], **Amit Gupta**[2] **and Ruchi Garg**[3]
[1]*D.J. College of Engineering & Technology, Modinagar, Ghaziabad, INDIA*
deepankarxyz@rediffmail.com
[2]*KIET, Ghaziabad, INDIA*, amitid29@gmail.com
[3]*MIET, Meerut, INDIA*, ruchigarg15@gmail.com

In this paper, the authors have studied stochastic behavior of an industrial problem related to sugar plant. A sugar plant is complex system with various subsystems; viz., feeding

system, cane cutters, crushing system, boilers and the mills. The system under consideration is Non-Markovian, supplementary variables have been used to convert this in Markovian. Mathematical model of considered system has been solved by using Laplace transform. Transition-state diagram has been shown. Reliability, M.T.T.F. and availability of the system have been computed. Ergodic behavior and a particular case for the considered system have been obtained to improve practical utility of the model. A numerical illustration and its graphical representation have also been appended in the end to highlight important results of the study.

Performance Measures of Nuclear Reactor with Standby Generators and Head-of-Line Repair

Sunil Kumar Mittal[1], **Deepankar Sharma**[2] **and Pawan Sharma**[3]
[1]*M.M.(P.G.) College, Modinagar, INDIA*, mittalsk@rediffmail.com
[2]*D.J. College of Engineering & Technology, Modinagar, Ghaziabad, INDIA*
deepankarxyz@rediffmail.com
[3]*Indraprastha Engineering College, Ghaziabad, INDIA*, sharma.pawan96@yahoo.com

In this paper, the authors have studied about profit estimation of nuclear power generation plant. Nuclear reactor, system configuration has been shown. Since, the system under consideration is Non-Markovian, the supplementary variables have been used for mathematical formulation of the model. Laplace transform is being utilized to solve the mathematical equations. Some particular cases and asymptotic behavior of the system have also been derived to improve practical importance of the model. Expressions for availability and profit function have been computed. A numerical example together with its graphical illustration has been appended in the end to highlight important results.

Availability Analysis for Summer Air Conditioner with Pre-emptive Resume Repair

Deepankar Sharma[1] **and Surabhi Agarwal**[2]
[1]*D.J. College of Engineering & Technology, Modinagar, Ghaziabad, INDIA*
deepankarxyz@rediffmail.com
[2]*A.K.G. College of Engineering & Technology, Ghaziabad, INDIA*
surbhi6000@gmail.com

In this paper, the authors have considered a summer air conditioning system for a place in hot and dry weather. The authors have computed the availability and profit function for this system. Since the system under consideration is of Non-Markovian nature, the authors have used supplementary variables to convert this into Markovian. Probability considerations and limiting procedure have been used for mathematical formulations of the system. This mathematical model has been solved by using Laplace transform, to obtain probabilities of various transition states.

All failures follow exponential time distribution whereas all repairs follow general time distribution. Pre-emptive resume policy has been adopted for repair purpose. Asymptotic behavior and a particular case, when repairs follow exponential time distribution, have been computed to enhance practical utility of the system. Reliability, availability and M.T.T.F. for considered system have been obtained. Graphical illustration followed by a numerical computation has also been appended to highlight important results of this study.

Stochastic Behavior of Nuclear Reactor with Standby Generators and Pre-emptive Resume Repair

S.K. Sharma[1], Deepankar Sharma[2] and Amit Kumar[3]
[1]*NAS College, Meerut, INDIA*, sksharma@rediffmail.com
[2]*D.J. College of Engineering & Technology, Modinagar, Ghaziabad, INDIA*
deepankarxyz@rediffmail.com
[3]*KNGD Modi College of Engineering & Technology, Modinagar, INDIA*
kalsania842007@rediffmail.com

In this paper, the authors have studied about availability estimation of nuclear power generation plant. Nuclear reactor, system configuration has been shown. The whole system gets fail if any of its subsystems stop working. Pre-emptive resume policy has been adopted for repair purpose. All failures follow exponential time distribution whereas all repairs follow general time distribution. State-transition diagram has been shown.

Since, the system under consideration is Non-Markovian, the supplementary variables have been used for mathematical formulation of the model. Laplace transforms is being utilize to solve the mathematical equations. Some particular cases and asymptotic behavior of the system have also been derived to improve practical importance of the model. Expression for availability function has been computed. A numerical example together with its graphical illustration has been appended in the end to highlight important results.

Multiobjective Stochastic Linear Programming Problem Through Fuzzy Approach

Vinay Singh
Banaras Hindu University, Varanasi, INDIA
vinaybhu1981@gmail.com

In this paper, we have focused on multiobjective stochastic linear programming problem (MOSLPP) with random variable coefficient in objective and constraints. After converting the proposed problem into deterministic problem (which may be linear or non-linear), fuzzy approach is applied to find compromise solution for the decision maker. We have also shown the application of the deterministic models to find the solution of a numerical example.

Availability and Cost Analysis of a Two Unit Parallel Redundant Complex System under Head-of-Line Repair Policy

Monis Masood[1] and Deepankar Sharma[2]
[1]*NAS College, Meerut, INDIA*, monis1up@rediffmail.com
[2]*D.J. College of Engineering & Technology, Modinagar, Ghaziabad, INDIA*
deepankarxyz@rediffmail.com

In this paper, the authors deal with the availability and cost analysis of a complex system consisting of three subsystems (namely A, B and C) connected in series. The subsystems A and C are series systems having N and M identical units, respectively. The subsystem B is a parallel redundant system. The whole system can fail either due to normal working or due to common-causes.

Availability Evaluation for Sugar Plant with Standby Boilers

P.K. Gupta[1] **and Vikas Kumar Tyagi**[2]
[1]*DAV College, Muzaffarnagar, INDIA*
pkgupta@rediffmail.com
[2]*SRM University, NCR Campus, Ghaziabad, INDIA*

In this paper, the authors have studied stochastic behavior of an industrial problem related to sugar plant. System configuration has been shown. All failures follow exponential time distribution whereas all repairs follow general time distribution. Since the system under consideration is of Non-Markovian, supplementary variables have been used to convert this in Markovian. Mathematical model of considered system has been solved be using Laplace transform. Transition-state diagram has been shown. Reliability, M.T.T.F and availability of the system have been computed. Steady-state behavior and a particular case for the considered system have been obtained to improve practical utility of the model. A numerical computation and its graphical representation have also been appended in the end to highlight important results of the study.

Computation of Various Reliability Parameters of a Summer Air Conditioning System by Using Boolean Function Expansion Algorithm

C.K. Goel[1]**, Deepankar Sharma**[2] **and Vinit Kumar Sharma**[3]
[1]*D.J. College of Engineering & Technology, Modinagar, Ghaziabad, INDIA*
deepankarxyz@rediffmail.com
[2, 3]*CCS University, Meerut, INDIA*
[2]ck_goel2004@yahoo.com, [3]vksharmaxyz_1@rediffmail.com

In this paper, "a summer air conditioning system for a place in hot and dry weather" is considered to evaluate the reliability and mean time to failure. Such systems are used for hot and dry outdoor conditions like Nagpur, Delhi, Bhopal and other places. It has been assumed that the failure rates for various components of the complex system follow arbitrary distribution and there is no service facility to repair the considered system. Reliability of the complex system has been computed when the failure rates of various components follow either Weibull or exponential distribution. M.T.T.F., an important parameter of reliability has also been evaluated for exponential distribution. A numerical example along with tables and graphs has been appended at the end to highlight the important results.

Reliability Measures for a System Having Two-Dissimilar Cold Standby Units with Random Check and Priority Repair

S.K. Sharma[1]**, Deepankar Sharma**[2] **and Vinita Sharma**[3]
[1,3]*NAS College, Meerut, INDIA*
[1]sksharma@rediffmail.com, [3]vinita@rediffmail.com
[2]*D.J. College of Engineering & Technology, Modinagar, Ghaziabad, INDIA*
deepankarxyz@rediffmail.com

In this paper, the authors have considered a cold standby system with two dissimilar units. These two units are named as priority unit (P-unit) and standby unit (S-unit). The main

working unit is P-unit but on failure of this unit we may online S-unit through an imperfect switching device. This S-unit is not efficient to fulfill the requirements similar to P-unit. In this study, the authors have been used a random check for S-unit during its non-operation period. Mathematical model of the system has been solved with the help of Laplace transform. *Head-of-line policy* has been used for repair purpose. Asymptotic behavior of system and some particular cases have been computed to improve practical utility of the model. Reliability function, availability function and M.T.T.F. of considered system have been obtained. At the last, we appended a numerical illustration together with its graphical representation to highlight important results of this study.

Operational Capabilities of a Four Cylinder Fuel System in Petrol Engine with Standby Fuel Backup and Perfect Switching

Satosh Kumar Sharma[1], Deepankar Sharma[2] and Jitendra Kumar Rana[3]
[1]*D.J. College of Engineering & Technology, Modinagar, Ghaziabad, INDIA*
deepankarxyz@rediffmail.com
[2,3]*NAS College, Meerut, INDIA*
[2]sksharma@rediffmail.com
[3]jrana@rediffmail.com

In this paper, the authors have considered a four cylinder fuel system in petrol engine with one alternative fuel source (like LPG, CNG etc.) keeping in standby arrangement and followed online through a perfect switching device. The efforts have done to obtain operational capabilities of this system.

Since the system under consideration is Non-Markovian, the authors have been used supplementary variables to convert this in Markovian. Mathematical formulation of the system has done by using probability consideration and limiting procedure. So obtained mathematical model has solved by the help of Laplace transform. Availability and cost function of considered system have been computed. Asymptotic behavior and a particular case, when all repairs follow exponential time distribution, have also been obtained to improve practical utility of the model. Graphical illustration followed by a numerical example has been appended at the end to highlight important results of this study.

Cost Analysis for Two-Dissimilar Cold Standby Units with Random Check and Imperfect Switching

Pooja Shakun[1] and R.C. Tomar[2]
[1]*IMS, Ghaziabad, INDIA*
poojashakun@yahoo.co.in
[2]*M.M.H.College, Ghaziabad, INDIA*
ashok_jaistv@yahoo.com

In this paper, the authors have considered a cold standby system with two dissimilar units. These two units are named as priority unit (P-unit) and standby unit (S-unit). The main working unit is P-unit but on failure of this unit we may online S-unit through an imperfect switching device. This S-unit is not efficient to fulfill the requirements similar to P-unit. In this study, the authors have been used a random check for S-unit during its non-operation period.

Availability function and cost function of considered system have been obtained. Asymptotic behavior of system and some particular cases have also been computed to improve practical utility of the model. At the last, we appended a numerical illustration together with its graphical representation to highlight important results of this study.

Availability Estimation for a Solar PV System with Head-of-Line Repair

S.K. Mittal[1], Deepankar Sharma[2] and Arun Kumar Sharma[3]
[1,3]*M.M.(P.G.) College, Modinagar, INDIA*
[1]mittalsk@rediffmail.com
[3]kumararun_121@yahoo.com
[2]*D.J. College of Engineering & Technology, Modinagar, Ghaziabad, INDIA*
deepankarxyz@rediffmail.com

In this model, the authors have considered a solar PV system with head of line repair. Supplementary variable technique and Laplace transform have been used to formulate and solve the mathematical model of considered system, respectively. Availability and profit function of consideration system have been computed. Ergodic behavior of the system and a particular case (when all repairs follow exponential time distribution) have been obtained to improve practical utility of model. A numerical example together with its graphical illustration has been also appended in the end to highlight important results of the study.

PS8: Wave Propagation and Deformation Analysis

General Theorems and Eigenvalue Problem in the Linear Theory of Porous Piezoelectric Materials

Anil Vashishth[1] and Vishakha Gupta[2]
Kurukshetra University, Kurukshetra, INDIA
[1] anil_vashishth@yahoo.co.in
[2] vi_shu85@yahoo.co.in

General theorems in the linear theory of porous piezoelectric materials are proved for the quasi-static electric field approximation. The Uniqueness theorem is established after proving the theorem of reciprocity. Alternative proof of the uniqueness theorem without using reciprocal relation is also given.

Firstly, the vectors, operators and the appropriate function spaces are introduced. Secondly, self-adjointness and the positiveness of the operator defined on the appropriate function spaces are proved. Frequency shift problem associated with eigenvalue problem is also studied using perturbation method and variational method.

Elastic-Plastic Transition in a Transversely Isotropic Thin Rotating Disc Having Variable Density with Edge Loading

Pooja Mahajan
Sai Institute of Engineering & Technology, Manawala, Amritsar, INDIA
mathpooja@rediffmail.com

In this paper, we investigated the influence of density on the elastic-plastic stresses in a transversely isotropic thin rotating disc with edge loading by using Seth's transition theory. The effects of angular speed have been discussed for initial yielding and fully- plastic state. A thin rotating disc made of isotropic material (Brass) whose density increases rapidly requires higher percentage increase in angular speed to become fully- plastic as compare to rotating disc having constant density or whose density decreases rapidly and made of transversely isotropic material. Rotating disc having variable density and made of isotropic material have a tendency to fracture at bore i.e., it is where the largest tensile stress occurs as compare to rotating disc made of transversely isotropic material. The tendency of fracture at the bore increases with the increases with increase in edge loading.

Statistical Analysis of 3 Point Bend Testing for Ceramic Samples

Mohammad Siddiqui[1] and Neal Ricks[2]
Florida International University, Florida, USA
[1]msidd005@fiu.edu
[2]ricksn@fiu.edu

In the present work three point bend testing and four point bend testing of high temperature cofired ceramic (HTCC) and low temperature cofired ceramic (LTCC) samples are done as per the ASTM standard C-1161. Four point and three point loadings were done using the prescribed standard spans. The flexural strength values were showing scattered values, the mean(S) and standard deviation (SD) values were calculated. Weibull statistical analysis is done in order to analyze the bending strength of high temperature cofired ceramic samples. There are 3 kinds of different samples for each of the two kind of ceramics HTCC and LTCC.

1. Plain samples corresponding to configuration A for ASTM C 1161 standard for 3 point bend testing.
2. Samples containing 6 empt vias of 200 micron size located symmetrically from both ends of the sample.
3. Samples containing 6 vias of 200 microns filled with Pt/Alumina composite conducting ink, located symmetrically from both the ends of the sample.

The present Weibull analysis include:

- Plotting the data and interpreting the plot
- Finite element analysis using CAD.

The primary advantage of Weibull analysis is its ability to provide fairly accurate failure analysis and failure forecasts with extremely small samples. A minimum number of 30 samples are tested for each of the three samples types mentioned above in order to do a reasonably accurate Weibull analysis. Graphs of probability of failure *vs* fracture stress is drawn.

Probability of failure is defined as :

$$P_f = 1 - exp\left[-\int v(\sigma/\sigma_0)mdV\right],\ \sigma > 0,$$

where σ = uniaxial tensile stress, σ_0 = Weibull material scale parameter (Strength relative to unit size), v = test specimen volume (or volume of effective gauge section if used) and m = Weibull modules Fractographic analysis of each failed test specimen was also performed in order to characterize fracture origins. A graphical representation of the failure data along with a test report is completed.

Lamb Waves in Transversely Isotropic Porous Piezoelectric Lamina

Anil Vashishth[1], Ashok Dahiya[2] and Vishakha Gupta[3]
Kurukshetra University, Kurukshetra, INDIA
[1] anil_vashishth@yahoo.co.in
[2] dahiyaashok46@yahoo.com
[3] vi_shu85@yahoo.co.in

The propagation of Lamb-type surface waves in a transversely isotropic porous piezoelectric lamina is studied analytically. The dispersion relation for the Lamb waves, propagating along an arbitrary direction, at the free surface of porous piezoelectric plate is obtained by separating closed form solution into symmetric and anti-symmetric modes. The existence of surface modes for each of the shorted case, free case and shorted-free case is also investigated. The transcendental dispersion relation is solved numerically for a particular model PZT. The effects of wave number, plate thickness, direction of propagation and the porosity on the phase velocities of Lamb waves are studied. The effect of elastic-electric interaction on the characteristics of Lamb-type surface waves is also investigated.

Torsional Wave Propagation in a Heterogeneous Layer over a Homogenous Half Space

Amares Chattopadhyay[1], Pato Kumari [2] and Vikash Sharma[3]
[1]*ISM University, Dhanbad, INDIA* amares.c@gmail.com
[2]*Jaypee University of Information Technology, Waknaghat, Solan, INDIA*
pato_praneta@yahoo.co.in
[3]*Ministry of Defence, DRDO, Delhi, INDIA*
vikash.vks123@gmail.com

The study of surface wave in a half space has their possible application in geophysical prospecting and in understanding the cause and estimation of damage due to earthquake. In the present work, the velocity equation for Torsional wave in a heterogeneous layer over a homogeneous half space has been derived. The closed form solutions for the displacement in

the layer and half space are also obtained. The study reveals that the layer inhomogeneity has a notable effect on the propagation of torsional surface waves. The velocities have been calculated numerically and the effects of heterogeneity on torsional wave velocity are shown graphically using 2D and 3D plot. It is also observed that the material heterogeneity present in the medium has significant effect on torsional wave velocity.

Boundary Characteristic Orthogonal Polynomials for the Vibration of Nonhomogeneous Rectangular Isotropic Plates of Linearly Varying Thickness

Roshan Lal[1] **and Yajuvindra Kumar**[2]
IIT Roorkee, INDIA
[1]rlatmfma@iitr.ernet.in
[2]yaju_saini@yahoo.com

Effect of nonhomogeneity on the free transverse vibration of thin isotropic rectangular plates of linearly varying thickness has been studied using boundary characteristic orthogonal polynomials in the Rayleigh-Ritz method. The variation of thickness is taken linear along the length of the plate. The orthogonal polynomials used herein are generated using the Gram-Schmidt process. The nonhomogeneity of the plate is assumed to arise due to linear variations in Young's modulus and density of the plate material with the space coordinates. Numerical results have been computed for four different combinations of clamped, simply supported and free edges. Effect of thickness variation together with varying values of aspect ratio and nonhomogeneity on natural frequencies is illustrated for the first three modes of vibration. A comparison of frequencies for the isotropic plates obtained from other methods has been presented.

Plane Strain Deformation Due to a Long Dip-Slip Fault in a Layered Elastic Medium

Neeru Bala[1] **and Sunita Rani**[2]
Guru Jambheshwar University of Science and Technology, Hisar, INDIA
[1]aninee@indiatimes.com
[2]s_b_rani@rediffmail.com

The earthquake cycle consists of four phases: preseismic, interseismic, coseismic, and postseismic. The coseismic phase of an earthquake is modelled by considering the static deformation. The aim of present paper is to consider the static deformation caused by a long dip-slip fault in a layered medium. We obtain the analytic expressions for the displacements and the stresses at any point of a two-phase medium consisting of a homogeneous, isotropic, perfectly elastic half-space in welded contact with a homogeneous, orthotropic, perfectly elastic half-space due to a dip-slip fault of finite width located at an arbitrary distance from the interface in the isotropic half-space. The Airy stress function approach is used to obtain the integral expressions for displacements and stresses at any point of the medium. The integrals have been evaluated analytically. The results are valid for an arbitrary dip angle. The case of a vertical dip-slip fault is considered in detail. The variation of displacement field with the distance from the fault and with depth is computed numerically.

Quasi-Static Deformation of a Poroelastic Stratum with Anisotropic Permeability and Compressible Constituents by Axisymmetric Surface Loads

Sunita Rani[1], **Sarva Jit Singh**[2] **and Raman Kumar**
Guru Jambheshwar University of Science and Technology, Hisar, INDIA
[1]s_b_rani@rediffmail.com
[2]s_j_singh@yahoo.com

An analytical solution to the axisymmetric quasi-static deformation of a poroelastic stratum, with anisotropic permeability and compressible fluid and solid constituents, subjected to normal loading is obtained. The analysis uses the fully coupled system of equations governing the axisymmetric quasi-static deformation of a poroelastic medium. The general solutions for the governing equations are obtained by using the Laplace and Hankel transforms techniques. These general solutions are then used to solve the problem of the consolidation of a stratum with free permeable surface resting on a rough - rigid impervious base. Once the solution is obtained in the Laplace-Hankel domain, the solution in the space-time domain has been obtained by applying inversions of integral transforms numerically. The case of normal loading is discussed in detail. Numerical computations are performed for normal disc loading to study the effect of anisotropy in permeability and the compressibility of the fluid and solid constituents on the consolidation process. It is found that the compressibility of the pore fluid increases the initial settlement ,but the final settlement remains unaffected. The thickness of the stratum has a significant effect on the surface settlement and pore pressure. For a thin stratum, the behavior of surface settlement is quite different from that one for a thick stratum or a uniform half-space.

Effect of Exponentially Temperature Variation on Vibration of Clamped Visco-Elastic Rectangular Plate whose Thickness Varies Linearly in Both Directions

Harvinder Kaur[1] **and A.K. Gupta**[2]
[1]*Govt. College, Barwala, Haryana, INDIA*
dr_hk2306@rediffmail.com
[2]*M.S. College, Saharanpur, INDIA*
gupta_arunnitin@yahoo.co.in

The main objective of the present investigation is to study the effect of exponentially temperature variation on vibration of clamped visco-elastic rectangular plate whose thickness varies linearly in both directions. It is assumed that the plate is clamped on all the four edges. It is assumed that the temperature varies exponentially in one direction. Rayleigh-Ritz technique has been used to determine the frequency equation. A two terms deflection function has been used as a solution. The assumption of small deflection and linear visco-elastic properties of 'Kelvin' type are taken. We have calculated time period and deflection at various points for different values of thermal gradients, aspect ratio and taper constants, for the first two modes of vibration. Results are supported by tables and graphs. Alloy 'Duralium' is considered for all the material constants used in numerical calculations.

PS9: Econometrics and Operations Research

Estimation of Regression Coefficient of the Selected Population, with an Application to Portfolio Theory of Corporate Finance

Aditi Kar Gangopadhyay[1], Praveen Kulshreshtha[2] and Sugata Gangopadhyay[3]
[1,3]*IIT Roorkee, INDIA*
[1]ganguli.aditi@gmail.com, [3]gsugata@gmail.com
[2]*IIT Kanpur, INDIA* pravk@iitk.ac.in

Estimation of parameters of the selected population is a very well studied problem.Till date all researchers have discussed the problem of estimation of either the location parameters or the scale parameters of the selected population(s). In this paper this problem is extended to the problem of estimation of regression coefficient of the selected bivariate population. For two bivariate populations it is demonstrated that the problem of estimation of the regression coefficient of the selected population can be reduced to the problem of estimation of the mean of the selected population as studied by Dahiya [Dahiya R.C. (1974) Estimation of the mean of the selected population. J. Amer. Statist. Assoc., 69, pp.226-230] assuming that the linear regression model is valid. These theoretical results are applied in portfolio theory and corporate finance. It is our expectation that development of theoretical results in this direction will enhance the applicability of the results on estimation after selection.

Nondifferentiable Multiobjective Second-Order Symmetric Duality Involving Generalized Cone F-Convex Functions

Shiv Kumar Gupta[1], Navdeep Kailey [2] and Mahesh Kumar Sharma[3]
[1]*IIT, Patna, INDIA*, skgiitr@gmail.com
[2,3]*Thapar University, Patiala, INDIA*
[2]kaileynavdeep21@gmail.com
[3]mksharma@thapar.edu

This paper is concerned with a pair of Mond-Weir type nondifferentiable multiobjective second-order symmetric dual programs over arbitrary cones. Usual duality results are established for aforesaid model under K-second-order F-convexity assumptions.

Fuzzy Parametric Geometric Programming on Fuzzy EPQ Model with Process Reliability Consideration

Ghanshyam Mahapatra[1], Biplab Mahapatra[2] and Tapan Roy[3]
[1,3]*Bengal Engineering and Science University, Shibpur, INDIA*
[1]g_s_mahapatra@yahoo.com, [3]tkroy_math@yahoo.com
[2]*Seacom Engineering College, Howrah, INDIA*
b_s_mahapatra@yahoo.com

An economic production quantity model has been developed with demand dependent unit production cost and fixed setup cost in fuzzy environment under flexibility and reliability consideration in the production process. The inventory related costs and other parameters

are taken as fuzzy in nature. The cost function of the economic production quantity model is formulated as a geometric programming problem. The problem is solved by parametric geometric programming technique. The model is illustrated through numerical example. The sensitivity analysis of the cost function due to different measures are performed and presented graphically.

Theoretical Aspects of Animal Diet Formulation: Mathematical Modeling Using Non-Linear Programming

Pratiksha Saxena
C.C.S. University, Meerut, INDIA
mathematics.pratiksha@gmail.com

This paper highlights some old and new approaches that may be useful in assisting livestock-dependent people to meet their production objectives through the planning of diets and feeding strategies for their animals. It first describes the initial application of mathematical techniques based on Linear programming (LP) using the simplex method or its derivatives. It explains that, although these simple applications have proved to be very effective in situations where one objective, generally profit maximization, is regarded as being overarching, they are of little use to livestock owners who keep their animals for multiple uses. Moreover, LP applications cannot identify near-feasible solutions that in many instances may be adequate for the user and more cost-effective. Although these drawbacks have been addressed by using a number of different approaches, each with its own merits, no single approach has been extensively adopted. We are focusing here on application of Nonlinear programming in the field of animal nutrition. It focuses on the drawbacks on the use of linear programming and specifies the conditions where Nonlinear Programming is of better use to formulate the diet of an animal. It also points out that the application of Nonlinear Programming gives the benefit of simultaneous inclusion of different kind of nutrient ingredient satisfying the feeding standards.

A Production Inventory Model over a Finite Planning Horizon with Time-Dependent Demand, Production and Deterioration

Prashant Jindal[1], S.R. Singh[2] and Rachna Kumari[3]
[1]*IIMT Engg College, Meerut, INDIA*, pras.jindal@gmail.com
[2]*D.N. Degree College, Meerut, INDIA*, shivrajpundir@gmail.com
[3]*Meerut College, Meerut, INDIA*, kumarn_inde@yahoo.com

An optimal inventory policy for a two-warehouse inventory model for deteriorating items with time-dependent demand has been developed. Compared with previous models, the model involves a free form time-dependent demand and product ion rates and a finite replenishment rate within a finite planning horizon with linearly time-dependent deterioration rates. It is assumed that the rates of deterioration of items in the two warehouses are different. An approach which permits variation in production cycle times is adopted to determine the number of production cycles and the times for replenishment during a finite planning horizon. Two special cases are further investigated that the model for non-deteriorating items can be deduced and that this two warehouse model can be treated as a one-warehouse model when both warehouses are identical in all surroundings.

Reliability Estimation of a Hybrid Geothermal Conventional Power Plant by Using Algebra of Logic

Chetna Sharma[1] **and Anil Sharma**[2]
[1] *U.P. Technical University, Lucknow, INDIA*
chetna_mit@rediffmail.com
[2] *M.I.T. Bulandshahr, INDIA*
anil_mit1@rediffmail.com

In this paper, the author has considered a hybrid geothermal conventional power plant for its reliability estimation by using algebra of logic. This plant produces electric energy from geothermal energy. Geothermal energy is a proven resource for direct heat and power generation. This power plant consists of six subsystems, connected in series. The first subsystem is geothermal fluid container and it contains the hot Braine at .C 100 as geothermal fluid. The second subsystem is heat exchanger and it contains two identical units in parallel redundancy. The third subsystem is a coumbustor boiler, which produces the steam to rotate turbine. This subsystem contains two identical units in standby redundancy. On failure of main boiler, we can switch on the standby unit in to operation through an imperfect switching device. The fourth subsystem is a turbine, which produces electric energy. The fifth subsystem is an electric network and it is used to store the electric energy produced by the rotating turbine. The sixth subsystem is a controlling value and it controls the supply of electric energy to consumers. The sixth subsystem contains two identical units in parallel redundancy. Algebra of logic and Boolean function technique have been used to formulate and solve the mathematical model of geothermal power plant. Reliability and M.T.T.F. of the power plant have been computed in two different cases, as

(i) when failures follow weibull time distribution, and

(ii) when failures follow exponential time distribution.

Graphical illustration of a numerical computation has also mentioned in the end to highlight important results of the study.

Optimal Ordering Policy for Deteriorating Items with Seasonal Pattern Demand and Expiration Date

Kuldeep Singh[1], **S.R. Singh**[2] **and Rachna Kumari**[3]
[1] *IIMT Engg College, Meerut, INDIA*, math26@gmail.com
[2] *D.N. Degree College, Meerut, INDIA*, shivrajpundir@gmail.com
[3] *Meerut College, Meerut, INDIA*, kumarn_inde@yahoo.com

Concept of deterioration is very realistic foremost of the products and must be considered by the retailer to determine his optimal ordering policy. In this paper we considered that the product is deteriorating linearly with time with a given expiration date. A deteriorating inventory replenishment model is prepared with seasonal pat tern demand and product expiration date. Shortages are al lowed to occur and fulfilled at the beginning of each replenishment cycle. The model with price discount and without price discount are developed and compared.

Production-Inventory Model for Ameliorating and Deteriorating Items with Retailer Limited Storage Facilities and Time Discounting

S.R. Singh[1], **Neeraj Kumar**[2] **and Rachna Kumari**[3]
[1]*D.N. Degree College, Meerut, INDIA*, shivrajpundir@gmail.com
[2]*IIMT Enggineering College, Meerut, INDIA*, neerajkapil99@yahoomail.com
[3]*Meerut College, Meerut, INDIA*, kumarn_inde@yahoo.com

In this study, we develop a production inventory model of both the manufacturer and the retailer, where the retailer's have two-storage facilities in which one is the own warehouse and the other is a rented warehouse. In this system, it is assumed that the holding cost in RW is greater than that in OW. The model considered both amelioration and deterioration effect taking account of multiple deliveries, time discounting and partial backordering. The amelioration and deterioration follows the two-parameter Weibull distribution. The amelioration rate is a decreasing function with time and is greater than the deterioration rate. We apply the discounted cash flow (DCF) approach and optimization technique to determine the optimal production and replenishment policy.

Analysis of Employee Absenteeism and its Application in Manpower Estimation

K.M. Mittal[1] **and Surender Kumar**[2]
[1]*IILM Institute for Higher Education, New Delhi, INDIA*
[2]*IILM Academy of Higher Learning, Greater Noida, INDIA*
surender.kumar@iilm.ac.in

Incidence of employee absenteeism is an important factor in staff assessment studies. The paper covers a case in two parts, first part covers analysis of absenteeism in a hospital, and the second part covers staff assessment exercises for select staff categories, in which absenteeism factors determined vide part one were utilized in these exercises. Case study 1 included in the part one related to the analysis of absenteeism in a public hospital environment covering outpatient, in-patient, emergency and diagnostic services, while case study 2 covering part two included select staff assessment exercises wherein case study 1 provided necessary inputs. The portion pertaining to the absenteeism is based on complete count (census) and not any sampling. Absenteeism analysis covers pattern of availing all common types of leaves such as casual leave, earned leave, sick leave, and special leaves on account of other factors including unpaid leave. Absenteeism data were analyzed for class I, II, III and IV staff categories and variation analyzed according to months for different groups of hospital services. Case study 2 included in the paper related to select cases for staff assessment exercises in these groups of hospital services.

Minimum Variance Stratification for Scrambled Response

P. K. Mahajan
Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan, INDIA
pawan_uhf@yahoo.com

The paper considers the problem of Optimum Stratification for Scrambled Response and proposes the rule for finding optimum strata boundaries. An asymptotic expression for

variance has also been obtained which gives an insight into the manner in which the variance reduces with increase in the number of strata.

Study of Stochastic Logistic Model for Stock Market Volatility

Karuna Chauhan[1], **K.K. Kaushik**[2] **and Surender Kumar** [3]
[1,2]*H.P. University, Summer Hill, Shimla, INDIA*
[1]karuna_hpu@rediffmail.com
[2]kaushik_hpu@rediffmail.com
[3]*IILM Academy of Higher Learning, Greater Noida, INDIA*
surender.kumar@iilm.ac.in

A stochastic logistic differential equation with a time-varying parameter is used to model the growth of stock market. Investigation carried out in this paper we have considered homogeneous investors population constituting a part or component of system. We have obtained time dependent solution of the stochastic logistic model of stock market with multiplicative fluctuations.

Measurement of Transparency in Financial Disclosure and Corporate Governance - An Indian Perspective

Niti Sanan
IILM Institute for Higher Education, New Delhi, INDIA
neeti.sanan@iilm.edu

The Satyam scandal has once again forced the Indian financial system to relook at the issues of corporate governance ailing our economy. The often asked question whether companies are managed in the best interest of shareholders and other company stakeholders such as employees, bankers, government and society at large is being revisited. The concept of corporate governance hinges on transparency and accountability of financial disclosure. Disclosure and transparency are cornerstones of good governance. They determine the quality and reliability of financial and non-financial information provided by management to lenders, shareholders, and the public. The study is motivated by a dearth of literature on corporate governance practices in the developing world despite increasing interests in the topic.

In assessing the quality of Indian financial disclosure, this paper uses disclosure scores developed by Standard and Poor in their "Transparency and Disclosure Study" of 2002 to examine corporate governance practices of select large and medium Indian listed firms. It then calculates mean disclosure score for the sample. Statistical tests have been employed to determine the whether the differences in levels of disclosure are significant. The data for the analysis is collected from 24 listed companies on the National Stock Exchange. The companies have been categorized as large and medium based on market capitalization.

The findings of the study are consistent with findings reported in studies of other developing countries. Firm size has a significant effect on disclosure. However, the correlation between disclosure and leverage is insignificant. The findings of this study will help policy makers and practitioners in formulating corporate governance policies. However, one limitation of this research is that it focuses only on listed companies.

A Test for Exponentiality Against NBUL Alternatives using Positive and Negative Proper Fractional Moments

M. Z. Anis
SQC and OR Unit, Indian Statistical Institute, Kolkata, INDIA
mohdzanis@yahoo.com

In this paper a moment inequality for the class of New is Better than Used in Laplace ordering (NBUL) class of life distributions is derived. A simple test statistic for testing exponentiality against NBUL alternatives is constructed. The test statistic is proved to be asymptotically normal and consistent. Critical values based on Monte Carlo simulation are tabulated for small sample sizes. The asymptotic relative efficiency of the test is also studied.

Estimation of Mean in Presence of Non-Response Using Exponential Estimator

Rajesh Singh[1], Manoj K. Chaudhary[2], Mukesh Kumar[3] and Florentin Smarandache[4]
[1,2,3]*Banaras Hindu University, Varanasi, INDIA*
[1] rsinghstat@yahoo.com
[2] ritamanoj15@gmail.com
[4]*University of New Mexico, Gallup, USA*
smarand@unm.edu

This paper considers the problem of estimating the population mean using information on auxiliary variable in presence of non response. Exponential ratio and exponential product type estimators have been suggested and their properties are studied. An empirical study is carried out to support the theoretical results.

Life-Path: A Ray

Mohan Sharma
Kurukshetra University, Kurukshetra, INDIA
mds_here@yahoo.co.in

Starting with the procedure of prediction of life-path of a child born on our planet Earth, a couple of queries, which are generally avoided by the professional astrologers, are identified. In a bid to answer these queries, the process of astrological prediction is analyzed through the mathematical interpretation. This defines life-path as an optimized curve, which, according to the Fermat's principle, should be a path of shortest travel time. Such a curve is identified as a geodesic on a surface or a ray in space. This ray is identified uniquely through a parameter called 'ray parameter', which depends upon the initial point, the initial direction of the ray and the physical character of the medium of travel.

The birth chart used in astrology is drawn on the basis of the initial point, i.e. birth (time and place). This implies that the curve (birth chart) used by the practising astrologers is based on the incomplete input, i.e. one of the three points required for its uniqueness. This insufficient input is the reason for the unanswerable queries encountered in the astrology being practised. With an insufficient input the astrological (or, any) system may not provide a unique curve (input-output relation), which is an essential requirement for any prediction (or inversion). Hence, the astrological practices based on initial point (birth) only may not be expected to yield correct predictions at any go. This study motivates to construct a ray (or life) parameter that can uniquely identify a life and then to use the value of ray parameter to draw an accurately-predictable life-path.

Modeling of Blast Impact on Buried Structure from Underground Conventional Weapon

Vikash Sharma
Ministry of Defence, DRDO, Delhi, INDIA
vikash.vks123@gmail.com

Vital assets of strategic importance placed underground are in more and more threat due to increasing terrorist activities. The fundamental goal to protect the underground construction is to improve the probability of survival of people and other contents in a given facility for a given threat. It is important to realize that the protective building is the last layer of defense against a threat and that all other protective measure (intelligence, law enforcement, surveillance, barriers, etc.) have failed if the threat can be projected onto a facility. This implies that a designer must be aware with the threat before conceptualizing the design and this may not be possible in many cases. Attackers can use various weapon systems in different combinations and such events cannot be predicted. The present paper simulates the blast response of a buried structure under different geomedia from underground conventional weapon. To calculate the blast impact, pressure-impulse criterion is used. Algorithm to find optimal combination of different structure parameters to survive a particular blast is derived, and shown by numerical simulation. Optimal combination of structure parameters is suggested for minimization of blast impact. GUI software in MATLAB is used for numerical simulation.

Allocation of Samples for Evaluation of the Development Programme Implemented in Phased Manner with Multiplicity Impact

Rajiv Pandey[1] and Med Ram Verma[2]
[1]*Indian Council of Forestry Research & Education, Dehradun, INDIA*
rajivfri@yahoo.com
[2]*ICAR Research Complex (NEH Region), Umiam, Meghalaya, INDIA*
medramverma@rediffmail.com

Impact evaluation of any development programme such as rural development is essential to examine the impact of development programnme for its intended purposes to the communities. It is essential for decision makers to regulate policy planning and its successful implementation. For the programmes deal the rural issues, impact evaluation enables us to study the socio-economic characteristics of the beneficiaries of the development programme

and effective changes in their livelihood due to the programme. However, due to addressing of larger masses, most of the development programmes are implemented in the phased manner. And the units of the population, which are under the influence of the development programme, receive or benefitted the programme effect either in linear or nonlinear manner. Therefore, traditional allocation of samples for studying the evaluation may leads to the wrong interpretations. Therefore, to tackle this problem of phased implementation of the development programme, we have assigned the temporal weights to the units receiving the benefits of the development programme. It is with the logic that the allocation of samples in different strata based on phased implementations needs special attention due to its temporal impact on the units. We have considered the problem of allocation of sample size in different strata for impact evaluation of the development programme with the assumption that the impact of latter phase is a multiplicative product of constant factor with the farmer phase. We have proposed a method of sample allocation, which can be used if the development programme is implemented in different phases.

A Family of Ratio-cum-Product Type Exponential Estimator in Sample Surveys

Rajesh Singh[1], **Nirmala Sawan**[2] **and Pankaj Chauhan**[3]
Banaras Hindu University, Varanasi, INDIA
[1] rsinghstat@yahoo.com
[2] nirmalasawan@gmail.com
[3] pankajchauhan78@gmail.com

This paper presents a family of ratio-cum product type exponential estimators for estimating finite population mean. Under simple random sampling without replacement (SRSWOR) scheme, the expressions of bias and mean squared error (MSE) up to the first order of approximation are derived. It has been shown that the proposed family is more efficient than usual unbiased estimator and Bahl and Tuteja estimator. An empirical study is carried out to illustrate the performance of the constructed estimators over others.

Improved Sampling Strategies Based on Modified Ratio Estimator

Shashi Bhushan[1] **and M.L. Masaldan**[2]
[1]*Mizoram University, Aizawl, INDIA*
dr.shashibhushan@ymail.com
[2]*CCSM University, Meerut, INDIA*

In this paper we have proposed to use two sampling strategies based on the modified ratio estimator using the coefficient of variation and the coefficient of kurtosis of the auxiliary variable by Upadhyaya and Singh for estimating the population mean (total) of the study variable in a finite population. Also the proposed sampling strategies utilizing the information about the population mean and coefficient of variation of the auxiliary variable are shown to be better in the sense of unbiasedness and smaller mean square error. A comparative study is made with usual sampling strategies utilizing the availability of the range prior information regarding the optimizing value of the characterizing scalar. Finally some concluding remarks are given and an empirical study is included as an illustration.

Estimation for the Generalized Life Distributions in the Presence of Masked Data

Sanjeev Kumar Tomer[1] **and Ashok Kumar Singh**[2]
Banaras Hindu University, Varanasi, INDIA
[1]sktomer73@gmail.com
[2]ashokstat@gmail.com

In the analysis of lifetime data from multi-component systems, one important problem, that often arises, is the estimation of component reliability using the system life test data. These component estimates are very useful in system manufacturing or assembly process. But, the analysis of such data become complicated when the exact component causing the failure of the system is not identified due to cost or time constraints. The resulting data in such a cases are termed as 'masked data'.

In this paper, we consider multi-component series systems when the lifetime of each component follows 'generalized life distributions'(GLD) which covers many life time distributions as special cases. We obtain maximum likelihood estimators, generalized maximum likelihood estimators and Bayes estimators for the parameters included in GLD in the presence of 'masked data'. To show how one can use the result for any real life problem, we present a simulation study.

Estimation of Geometric Mean with and without Using Auxiliary Information

Rajesh Kumar Gupta[1] **and Sheela Misra**[2]
[1]*Jubilant Clinsys Clinical Research Ltd., Bangalore, INDIA*
rajeshgupta2004@gmail.com
[2]*Lucknow University, Lucknow, INDIA*
drsheelamisra@gmail.com

This Paper is an attempt to provide estimators for measure of population geometric mean. It is often the case that the variable under study for example the per capita income, the average operational holding size, per capita fuel wood consumption are some of the parameters which give very misleading conclusions for the population due to high skewness of the variables, also in medical studies variables with normal and symmetrical distribution are very rare (say for example survival times). In such cases of distribution the arithmetic mean may not be most appropriate measure of the average of the variables and it is preferable to use either the median or the geometric mean. For positively skewed distribution, geometric mean is a more appropriate measure of location than the mean as it gives larger weight to smaller values than larger values of variables. Geometric Mean is specifically useful in averaging ratios, percentages and rates of change in one period over the other. In this paper we proposed different estimators for the geometric mean of the population characteristics with and without using auxiliary information, derived their mean square errors (MSEs), upper bounds under certain realistic assumptions and compared them in the sense of relative efficiency and optimum conditions to use these estimators. An empirical study is also provided showing the increased efficiency of the proposed estimators.

An Improved Generalized Class of Estimators for Finite Population Variance

Sheela Misra[1] **and Rajesh Kumar Gupta**[2]
[1]*Lucknow University, Lucknow, INDIA*
drsheelamisra@gmail.com
[2]*Jubilant Clinsys Clinical Research Ltd., Bangalore, INDIA*
rajeshgupta2004@gmail.com

For estimation of finite population variance σ_Y^2 and an improved generalized class of estimators t_0 using auxiliary information on single auxiliary variable x has been proposed in this paper. Its bias and mean square error are found. A comparative study as regard to its efficiency is done with the conventional and usual sample mean square estimator s_Y^2. This class of estimators has further been extended to a new improved class of estimators t by relaxing some condition on t_0 and its properties are extensively studied. An optimum sub class of estimators belonging t_0 and t are also found.

Non-parametric Tests for Testing Simple Ordered Alternative of Scale Parameters Using Two-Sample Statistics

Amar Nath Gill[1], **Vishal Maurya**[2] **and Parminder Singh**[3]
[1,2]*Panjab University, Chandigarh, INDIA*
[1]angill@pu.ac.in
[3]*Guru Nank Dev University, Amritsar, INDIA*

Let $X_{i1}, X_{i2}, \ldots, X_{in_i}$, be a random sample of size n_i from a population π_j with absolutely continuous distribution function (cdf) $F_i(x) = F\left(\frac{x-\mu_i}{\theta_i}\right)$ for some unknown distribution function $F(x)$ and unknown location (scale) parameter $\mu_i \in (-\infty, \infty)$ $(\theta_i > 0)$, $i = 1, \ldots, k$. Let the observations from these k populations be mutually independent. In this paper a test procedure for testing the null hypothesis $H_0 : \theta_1 = \cdots = \theta_k$ against the ordered alternative $H_1 : \theta_1 \leq \cdots \leq \theta_k$, with at least one strict inequality, is proposed in the non-parametric set up in two practical situations: (i) all the populations possibly differing in scale parameters have common unknown location parameter and; (ii) all the populations possibly differing in scale parameters have common known quantile of order p, not necessarily equal to half. We have used consecutive two-sample rank statistics in situation (i) and consecutive two-sample U-statistics in situation. (ii) Construction of non-parametric simultaneous lower confidence bounds for successive ratios of scale parameters θ_{i+1}/θ_i, $i = 1, \ldots, k-1$, is also discussed under the practical situation. (ii) Implementation of the proposed procedures, in the balanced case (equal sample sizes), is demonstrated using asymptotic normality of two-sample rank statistics and two-sample U-statistics.

Student Session
R.S. Verma Memorial Best Paper Award

The Use of Parabolic Arc in Matching Curved Boundary by Point Transformations for Septic Order Triangular Element

V Kesavulu Naidu[1] **and K V Nagaraja**[2]
Amrita School of Engineering, Bangalore, INDIA
[1]kesa78@gmail.com
[2]nagarajaitec123@yahoo.com

This paper is concerned with curved boundary triangular element having one curved side and two straight sides. The curved element considered here is the 36-node (septic) triangular element. On using the isoparametric coordinate transformation, the curved triangle in the global (x, y) coordinate system is mapped into a standard triangle:$\{(\xi, \eta)|0 \leq \xi,\ \eta \leq 1,\ \xi + \eta \leq 1\}$ in the local coordinate system (ξ, η). Under this transformation curved boundary of this triangular element is implicitly replaced by septic arc. The equation of this arc involves parameters, which are the coordinates of points on the curved side. This paper deduces relations for choosing the parameters in septic arc in such a way that the arc is always a parabola which passes through four points of the original curve, thus ensuring a good approximation. The point transformations which are thus determined with the above choice of parameters on the curved boundary and also in turn the other parameters in the interior of curved triangle will serve as a powerful subparametric coordinate transformation for higher order curved triangular elements with one curved side and two straight sides.

Separation Axioms For Generalized Fuzzy Topologies

Ratna Dev Sarma[1], **A Sharfuddin**[2] **and Anubha Bhargava**[3]
[1]*Rajdhani College, Delhi, INDIA*
ratna_sarma@yahoo.com
[2,3]*Jamia Milia Islamia, Delhi, INDIA*

Weaker forms of fuzzy continuity, based on different generalized forms open fuzzy sets, have been studied by several authors in the realm of fuzzy settings. However these studies have so far been sporadic. In our earlier papers we have tried to bring these studies under one umbrella. There, generalized open fuzzy sets, called γ-open fuzzy sets, were introduced using monotonic mappings defined on the family of fuzzy sets of a given set X. These γ-open fuzzy sets represent different generalized forms of open fuzzy sets under different sets of conditions. They also form a weaker form of a fuzzy topology on X, termed as generalized fuzzy topology. We have earlier investigated the properties of generalized fuzzy sets and generalized fuzzy topology further using the interior and closure operators. In the present paper, we define an operator called envelope on the family of fuzzy sets on X and discuss its properties. The fuzzy closure operator of a fuzzy topological space turns out to be a special case of this envelope. Also we introduce and investigate the separation axioms for a generalized fuzzy topology where the open fuzzy sets are replaced by generalized open fuzzy sets.

On Higher-Order Nonlinearity of Monomial Partial-Spreads Type Boolean Functions

Ruchi Telang[1] **and Sugata Gangopadhyay**[2]
IIT Roorkee, INDIA
[1] telang.ruchi82@gmail.com
[2] gsugata@gmail.com

The r-th order nonlinearity $nl_r(f)$ of the Boolean function f, is the sequence of minimum Hamming distances between f and all n-variable Boolean functions of degree at most $r(r > 1)$. Nonlinearity profile of the Boolean function f which is the sequence of it r-th order nonlinearities, for r varying in the range 1 to $n-1$, is an useful cryptographic criterion in determining the security of cipher systems in which f is involved. Maximum r-th order nonlinearity of f is equal to the covering radius of the Reed-Muller codes, so this criterion is also related to coding theory. This paper estimates the lower bounds of some higher order nonlinearities of an important class of cryptographic Boolean functions, called Monomial Partial Spreads functions on 6 and 8 variables. Here we tightens the lower bounds of second-order nonlinearity of monomial Partial Spreads on 6-variables and third-order nonlinearity of monomial Partial Spreads on 8-variables. This is done by computing the Walsh spectrum of that higher order derivative of function which is quadratic.

Use of Dynamic Non-Linear Bio-Economic Model for Analyzing Changes in Land Use and Forest Degradation in a Himalayan Watershed

Rakesh Kumar Sharma[1], **Prem Lall Sankhayan**[2] **and Ranveer Singh**[3]
[1] *Government College for Girls (RKMV), Shimla, INDIA*
rakeshinshimla@yahoo.co.in
[2] *University of Life Sciences, Aas, NORWAY*
prem.sankhayan@umb.no
[3] *Agro Economic Research Centre, H.P. University, Shimla, INDIA*
ranveersi@yahoo.com

Agriculture, horticulture, and forestry are the main stay of economy of Indian state of Himachal Pradesh. The economic, technological and institutional factors that affect the land use, needs to be analyzed in a holistic way, especially, in view of fast changing cropping patterns and declining forest density. Use of bio-economic programming model incorporating economic and ecological factors appears highly attractive tool of analysis at a micro watershed scale. The objective function of the model is to maximise the discounted gross margins from different set of activities, namely, agricultural, livestock and forestry over the model horizon 2007-26. The model becomes non-linear by incorporating variance and co-variance matrix of gross returns over the last five years. Model tries to investigate the effects of alternate policy scenarios on income levels, cropping patterns, biomass use and its growth, and labour and capital requirements over next twenty years by using General Algebraic Modelling Systems (GAMS). The biomass growth is based on the logistic growth model. Though the income level is increasing significantly by replacing the traditional crops with horticultural crops, but such changes are also accompanied with increased income risk. Cropping pattern is dominated by vegetable crops, such as, capsicum, beans, and tomato, and flower crop of chrysanthemum, when income risk is considered equivalent to the existing cropping plan. This shows diversification strategy on the part of native farmers in the

study watershed rather than going all out to maximise the profits. Biomass in the base scenario has a tendency to decline after the middle of model horizon, mainly due to higher requirements of biomass with increasing population. The biomass growth becomes sustainable, if there is an increase in emigration rate, higher use of liquefied petroleum gas (LPG) and substitution of improved livestock. A high degree of periodic losses and insufficient regeneration may pose serious implications for long term sustainability of biomass in the watershed. Positive response through some government policies can, however, change the scenario for the better.

On the Gravitational Instability of an Homogeneous and Heat Conducting Medium Under the Effect of Non Uniform Rotation and Magnetic Field

Joginder S. Dhiman[1] **and Rekha Dadwal**[2]
H.P. University, Summer Hill, Shimla, INDIA
[1]jsdhiman66@gmail.com
[2]reha_dadwal@yahoo.co.in

The gravitational collapse of a homogeneous medium, termed as the gravitational instability was first investigated by Jeans in 1902 [1]. He found that perturbations above a critical wavelength (the Jeans length) were unstable to gravitational collapse (also known as Jeans criterion), but that shorter wavelengths were unaffected due to the large-scale nature of the gravitational force. A comprehensive study of the gravitational instability has been made by Chandrasekhar [2], who included the effects of uniform rotation or/and magnetic fields, and established that the Jeans criterion remains unaffected by the individual or simultaneous action of a uniform rotation and a uniform magnetic field. Bel and Schatzman [3] studied the effect of a non-uniform rotation on the gravitational instability and provided an extension of Jeans criterion in this case. The stability investigations of gravitational instability of heat conducting medium in the frame work of various external force fields assume importance not only on account of being a mathematical extension of the problem but also because of its applications in many fields of practical interest in astrophysics. In the present paper, the effect of non-uniform magnetic field on the Jeans criterion for gravitational instability of an infinite homogeneous heat conducting medium under non-uniform rotation is analyzed.

References:

[1]. Bel, N., and Schatzman, E., (1958), Rev. Mod. Phys., 30, 1015.
[2]. Chandrasekhar, S.,(1961), Hydrodynamic and Hydromagnetic Stability p. 503, Oxford University Press.
[3]. Jeans J.H., (1902), Phil. Trans. R. Soc. 199, 49.

Discordancy Test for a Single Upper Outlier in Exponential Case

S. Lalitha[1] **and Nirpeksh Kumar**[2]
[1]*Banaras Hindu University, Varanasi, INDIA*
[2]*M.G. Kashi Vidyapeeth, Varanasi, INDIA*
nirpeksh@gmail.com

In this paper a discordancy test for a single upper outlier with slippage alternative, in exponential sample is proposed. The null distribution of the test statistic is derived using

a recursive relation which is in the lines of algorithm given by Lewis and Fieller [1979, A recursive algorithm for null distribution for outliers: I. Gamma samples. Technometrics. V. 21. 371-376.] for gamma sample. Using this, the critical region is determined for the test. Performance of the test is carried out and a simulation study is also done for supporting the said theory. The performance of this test was compared with some of the well-known tests like Dixon's and Likes's test.

Clustering of Countries According to Human Development Index Using Adaptive Dynamic Possibilistic Fuzzy Clustering Technique

Divya Jain[1], Vipin Tyagi[2] and D.S. Hooda[3]
Jaypee Institute of Engineering and Technology, Guna, INDIA
[1]agrawal_divya2002@yahoo.co.in
[2]vipin.tyagi@jiet.ac.in
[3]ds_hooda@rediffmail.com

In the present paper, we are presenting an algorithm to form the clusters of various countries according to their Human Development Index. In particular, the motive behind this is to analyze the present scenario of India in this context and to motivate the policy making think-tanks to form the policies accordingly which could help in further human development of our country. The paper presented here is based on "adaptive dynamic fuzzy possibilistic clustering".

A Deterministic Model for Channel Capacity with Utilities

D.S. Hooda[1] and Sonali Saxena[2]
Jaypee Institute of Engineering and Technology, Guna, INDIA
[1]ds_hooda@rediffmail.com
[2]sonali.saxena51@gmail.com

In the present communication the application of two 'useful' information measures have been studied. Various types of the channel have been discussed, particularly "Discrete Memory less channel". A new model for determination the channel capacity with utilities has been presented and a problem of decision-making has been discussed.

Unit Root Testing for the Time Series Model with Additive Outlier: A Bayesian Approach

Jitendra Kumar[1], Ashutosh Shukla[2] and Anoop Chaturvedi[3]
[1,2]*Allahabad Agriculture Institute-Deemed University, Allahabad, INDIA*
[1]jitendra_20932@rediffmail.com
[2]ashutoshstats@gmail.com
[3]*University of Allahabad, Allahabad, INDIA* anoopchaturv@gmail.com

The presence of outliers in the time series may have serious implications in the estimation of parameters or testing of hypothesis. The analysis of time series in the presence of outlier is not much explored using Bayesian framework. The present paper deals with the Bayesian

analysis of an autoregressive model involving linear time trend and contaminated by additive outlier. The issue of unit root hypothesis is dealt in Bayesian set-up and posterior odds ratio for the unit root hypothesis has been derived under appropriate prior assumptions. The numerical illustration is carried out for derived result and observed that if an additive outlier has its impact on posterior odds ratio.

Fuzzy Reliability Analysis of a Marine Power Plant Using Cut Set Approach

Amit Kumar[1], Sapna Gupta[2] and Ankush Kumar[3]
Thapar University, Patiala, INDIA
[1]amitkumar@thapar.edu
[2]sapnag25@gmail.com
[3]ankushgoyal87@gmail.com

In conventional reliability analysis, the failure probabilities of the components of a system are treated as exact values. It is often difficult to obtain data for failure probabilities under changing environmental conditions. Hence fuzzy sets are used to analyze the fuzzy system reliability, where a fuzzy number represents the reliability of each component. In this paper, a new method has been developed to analyze the fuzzy reliability of a marine power plant using cut set approach.

A New Algorithm for the Fuzzy Maximum Flow Problem

Amit Kumar[1], Neha Bhatia[2] and Parmpreet Kaur[3]
Thapar University, Patiala, INDIA
[1]amitkumar@thapar.edu
[2]neha26bhatia@gmail.com
[3]parmpreetsidhu@yahoo.com

In conventional maximal flow problems, it is assumed that decision maker is certain about the flows between different nodes. But in real life situations, there always exist uncertainty about the flows between different nodes. In such cases the flows may be represented by different type of fuzzy numbers. In the literature there are several methods to solve such type of problems. Till now no one has used ranking function to solve above type of problems. In this paper a new algorithm is proposed to find the maximal flow between source and sink by using ranking function.

Fuzzy Transportation Problem Using Generalized Fuzzy Numbers

Amit Kumar[1], Amarpreet Kaur[2] and Jolly Puri[3]
Thapar University, Patiala, INDIA
[1]amitkumar@thapar.edu
[2]amantoor@gmail.com
[3]puri.jolly@gmail.com

In conventional approach, it is assumed that decision maker is certain about the transportation cost in a transportation problem. In real life situation, there may be uncertainty about

the transportation cost(if the product is to be transported first time). In such a case, the transportation cost may be represented by different types of fuzzy numbers. Kaufmann and Gupta [Introduction to Fuzzy Arithmetic: Theory and Application, Van Nostrand Reinhold, New york, (1991)], represented the transportation cost by normalized triangular fuzzy numbers and purposed a method to solve such type of problems. In real life transportation problems, the obtained transportation cost are in the form of generalized fuzzy numbers instead of normalized fuzzy numbers. In this paper, generalized triangular fuzzy numbers have been used to represent the transportation cost and a method is purposed to find the optimal solution of above type of problems. Also it is shown that the results obtained by Kaufmann and Gupta are particular case of our approach.

On Some Kantorovich Type Inequalities and their Applications

Rajesh Sharma[1] **and Rajeev Bhandari**[2]
H.P. University, Summer Hill, Shimla, INDIA
[1]rajesh_hpu_math@yahoo.co.in
[2]raj.maths77@gmail.com

We discuss Kantorovich type inequalities for a particular class of linear operators called positive definite matrices, and their extensions and applications. The bounds for the spread and condition number of a positive definite matrix are obtained. Our results compare favorably than those obtained by Wolkowicz and Styan (Bounds for eigenvalues using traces, Lin. Alg. Appl. 29, 471-506, 1980). As a further application, we consider nth degree polynomial equation with all its roots positive and obtain bounds for the largest and smallest roots which also provide bounds for the span of the roots.

Ranking of Exponential Fuzzy Number Using Integral Value Approach

Amit Kumar[1], **Pushpinder Singh**[2] **and Amarpreet Kaur**[3]
Thapar University, Patiala, INDIA
[1]amitkumar@thapar.edu
[2]pushpindersnl@gmail.com
[3]amantoor@gmail.com

The ranking of fuzzy number has become an important component in the decision process. In fuzzy system fuzzy numbers must be ranked before an action is taken by a decision maker. Chen and Li [Representation, Ranking, and Distance of Fuzzy Number with Exponential Membership Function Using Grade mean Integration method, Tamsui Oxford Journal of Mathematical Sciences 16(2)(2000), 123-131.] proposed a ranking index for ranking exponential fuzzy numbers which does not depend on the height of fuzzy number. But in the literature it is shown that ranking index depends upon the height of fuzzy number. In this paper, using integral value approach [T.S.Liou, M.J.Wang, Ranking fuzzy number with integral values, Fuzzy Sets and System 50 (1992) 247-255.], a new ranking formula have been developed for the exponential fuzzy numbers which depends on height of fuzzy number. The developed ranking function can be used to solve real life problems.

Sensivity Analysis in Fuzzy Variable Linear Programming

Amit Kumar[1], **Arvind Kalia**[2] **and Rakesh Sharma**[3]
Thapar University, Patiala, INDIA
[1]amitkumar@thapar.edu
[2]kaliaiit@gmail.com
[3]doaa@thapar.edu

The fuzzy set theory is being applied massively in many fields these days. One of these is linear programming problems with fuzzy numbers. Upto best of my knowledge no research paper has been published in the literature in which ranking function is used for fuzzy sensitivity analysis. In this paper, we present the sensitivity analysis for fuzzy variable linear programming problem, using ranking functions.

Bayesian Unit Root Test for Time Series Models with Structural Break in Variance

Anoop Chaturvedi[1], **Rishi Kumar**[2] **and Jitendra Kumar**[3]
[1,2] *University of Allahabad, Allahabad, INDIA*
[1]anoopchaturv@gmail.com
[2]rishistats@gmail.com
[3] *Allahabad Agriculture Institute-Deemed University, Allahabad, INDIA*
jitendra_20932@rediffmail.com

The structural break affects the stationarity of a time series, the break in variance is studied in this paper under Bayesian framework. The posterior odds ratio has been derived with appropriate prior assumptions for the AR(1) time series model for testing of unit root hypothesis against the alternative of break in variance, shift in mean and stationarity of time series. A simulation study is also carried out for the theoretical derivations and result of simulated data favors the results. Derived theorems are also applied on export data of ASEAN countries and observed that if break in variance is considered, the hypothesis is rejected and if not, accepted

A Second Generation Wavelet Based Approach for Solving Multiscale Partial Differential Equations

Sarosh Quraishi[1], **Rahul Gupta and Sandeep Kumar**
Institute of Technology, BHU, Varanasi, INDIA
[1]sarosh.quraishi@gmail.com

The wavelets have significant advantages in solving PDEs as provides solution of a PDE in multiresolution. In this paper we present strategies for generating customized wavelets that are used as basis functions for solving PDEs in an optimal cost. The FEM is not efficient in solving PDEs that involve phenomena over a broad range of scales. We demonstrate that by using second generation wavelets, it is possible to customize the wavelet for a specific operator, and such customization leads to an optimal algorithm for solving multiscale PDEs. As a benchmark we have solved a few standard second-order elliptic PDEs with multiscale features that are commonly encountered in engineering and sciences. The utility of our method is demonstrated in solving problems with sharp gradients, singularities and other multiscale features.

Effect of Variable Magnetic Field and Permeability on the Stability of Stratified Rivlin-Ericksen Fluid-Particle Mixture in the Presence of Rotation

Urvashi Gupta[1] **and Harjot Kaur**[2]
Panjab University, Chandigarh, INDIA
[1]dr_urvashi_gupta@yahoo.com
[2]kaur.harjot87@gmail.com

Keeping in mind the applications of the flow through porous medium in geophysics, particularly in the study of earth's core, importance of viscoelastic fluids in industry and chemical technology and presence of dust/suspended particles in fluids; the hydromagnetic stability of stratified Rivlin-Ericksen fluid saturating a porous medium in the presence of rotation is presented. The stability of the motionless horizontal layer of the fluid having vertical stratifications of the physical parameters; density, viscosity, viscoelasticity, medium porosity, medium permeability, particle number density and magnetic field is considered. After linearizing the relevant hydromagnetic equations, the perturbed quantities are analysed in terms of normal modes. Dispersion relation governing the effects of viscoelasticity, porosity, medium permeability, suspended particles, rotation and magnetic field on the stability of Rivlin-Ericksen fluid is derived. The system is found to be stable for the case of stable stratification as in the case of Newtonian fluids. For the case of unstable stratification, magnetic field succeeds in stabilizing the otherwise unstable system for certain wave number range. The behavior of growth rates with respect to Alfven velocity, medium permeability, suspended particles and angular velocity are found analytically as well as numerically. It has been found that the growth rate decreases with the increase in Alfven velocity and angular velocity; and it increases with the increase in medium permeability and suspended particles.

A Subset Selection Procedure for Exponential Populations Based on Sample Quasi Ranges

Gulfam Siddiqui[1], **Narinder Kumar**[2] **and Gobind P Mehta**[3]
[1]*NCERT, New Delhi, INDIA*
gulstat@yahoo.com
[2,3]*Panjab University, Chandigarh, INDIA*
[2]nkumar67@yahoo.com
[3]gpmehta@gmail.com

The problem of selecting a subset of k exponential populations that includes the "best" population, i.e., the one with the largest value of the scale parameter based on sample quasi ranges is studied. The location parameters of the exponential distributions are assumed to be known and equal for all the k populations. Based on a common number of observations from each population, a sequentially rejective procedure is proposed. Tables of critical constants that are necessary to carry out the procedure are developed. Performance of the proposed procedure in comparison to the existing procedures of Siddiqui et al (2008) and Gupta (1963) is assessed through simulation study. The proposed procedure is also illustrated with the help of a real life example.

References:

Siddiqui, G., Kumar, N. and Mehta, G. P. (2008): A subset selection procedure for exponential populations. To appear in special issue of American Journal of Mathematical and

Management Sciences in honor of Bechoffer, Gupta and Sobel.
Gupta, S.S. (1963): On a selection and ranking procedure for gamma populations. Annals of Institute of Statistical Mathematics, 14, 199-216.

Z_4 - Linear GRM Codes

Seema Rani[1] **and Vinod Tyagi** [2]
University of Delhi, Delhi, INDIA
[1]seema4_007@yahoo.co.in
[2]vinodtyagi@hotmail.com

For any integers r, m and s where $0 \leq r < m$, $1 \leq s < \begin{pmatrix} m \\ r+1 \end{pmatrix}$, we construct a class of quaternary linear codes whose binary images under the gray map are GRM(r, m, s) codes of order $r + (r+1)_{m,s}$.

Starplus Nearly Compact Pseudo Regular Open Fuzzy Topology

Atasi Deb Ray[1] **and Pankaj Chettri**[2]
[1] *West Bengal State University, Kolkata, INDIA*
atasi@hotmail.com
[2]*Sikkim Manipal Institute of Technology, Gangtok, INDIA*
pankajct@gmail.com

A new form of fuzzy topology on function spaces, called starplus nearly compact pseudo regular open fuzzy topology is introduced. It is observed that such fuzzy topology is finer than pointwise fuzzy topology and weaker than a new fuzzy topology that is pseudo δ-admissible on starplus near compacta. A sufficient condition is also obtained under which starplus nearly compact pseudo regular open fuzzy topology coincides with pseudo δ-admissible fuzzy topology on starplus near compacta.

Concatenated Codes with Complementary Duals

R.S. Raja Durai[1] **and Meenakshi Devi**
Jaypee University of Information Technology, Waknaghat, Solan, INDIA
[1]rsraja.durai@juit.ac.in

A linear code with a *complementary dual* (*LCD* code) is defined to be a linear code $\mathcal{C}$ whose dual code $\mathcal{C}^{\perp}$ satisfies $\mathcal{C} \cap \mathcal{C}^{\perp} = \{\mathbf{0}\}$. The class of *T-Direct* codes are an extension to the class of *LCD* codes and are defined as the set of T F-ary linear codes $\Gamma_1, \Gamma_2, \ldots, \Gamma_T$ such that $\Gamma_i \cap \Gamma_i^{\perp} = \{\mathbf{0}\}$, where $\Gamma_i^{\perp} = \Gamma_1 \bigoplus \Gamma_2 \bigoplus \cdots \bigoplus \Gamma_{i-1} \bigoplus \Gamma_{i+1} \bigoplus \cdots \bigoplus \Gamma_T$ is the dual of Γ_i with respect to the direct sum $\Lambda = \Gamma_1 \bigoplus \Gamma_2 \bigoplus \cdots \bigoplus \Gamma_T \subseteq F^n$ for each $i = 1, 2, \ldots, T$ and denoted by $(\Gamma_1, \Gamma_2, \ldots, \Gamma_T)$. In this paper, algebraic constructions to a class of concatenated codes for two-user F-Adder Channel is considered. The notion of *concatenated codes with complementary duals* is introduced. Simple construction procedures for the defined class of *concatenated LCD* codes are given. It is shown that coding for both noiseless and noisy two-user F-Adder Channel can be done using these class of concatenated codes. Coding

for the noiseless two-user $GF(2^n)$-Adder Channel is described using a pair of *concatenated LCD* codes. Coding problem for the noisy 2-user $GF(2^n)$-Adder Channel is addressed via a pair of *concatenated LCD* codes obtained from the class of 2-*Direct* codes. Constructions to general classes of *concatenated LCD* codes obtained from the class of 2-Cyclic MRD codes are given to facilitate the coding schemes for the 2-user $GF(2^n)$-Adder Channel.

Set Theory and the Composition of Processors

Richa Gupta[1] **and K.S. Vankatesh**[2]
[1]*Jaypee Institute of Information Technology University, Noida, INDIA*
richa.gupta@jiit.ac.in
[2]*IIT Kanpur, INDIA*
venkats@iitk.ac.in

Zermelo Frankel Set Theory[1] has been used as a platform to obtain a set-theory level formulation of Signals and System Theory[2]. Here we present some generalized properties of processors (operators). Our general framework for signal and system theory will comprise the domain $\mathbf{D}$ and the range $\mathbf{C}$, taken to be unstructured nonempty sets, and different signals (functions) in the signal space $\mathbf{S}$ defined as different maps $s : \mathbf{D} \to \mathbf{C}$. Thus, $\mathbf{S} = \{s : \mathbf{D} \to \mathbf{C}\}$. Next a processor (operator), conventionally understood as an input-output system that produces an 'output' signal for each impressed 'input' signal is directly abstracted as a map $p : \mathbf{S} \to \mathbf{S}$ that simply associates each $s \in \mathbf{S}$ with some $s' \in \mathbf{S}$ that is deemed to the output corresponding to the input s. The space of all possible processors is thus defined: $\mathbf{P} = \{p : \mathbf{S} \to \mathbf{S}\}$.

We first define the point preservance and the point consonance notions, and the relationship of point preservance and point consonance with processor composition is explored. In continuation of the discussion of processors and their composition, a 'theory of orbits' is presented and the periodic behavior of processors under self-composition is also studied. An algorithm to generate the Cayley Table of composition of any two processors in a set of processor is given[3].

References:

[1]. Kuratowki K. and Mostowski A., "Set Theory", Vol. 1. North Holland, 1966.

[2]. Venkatesh K. Subramaniam, "Signals and Systems on Sets", PhD thesis, IITK, October 1994.

[3]. Richa Tayal, "Processor Composition, Complex Sets and Hyper processing", M.Tech thesis, IITK, July 2005.

Preservance Topology and Complex Set Theory

Richa Gupta[1] **and K.S. Vankatesh**[2]
[1]*Jaypee Institute of Information Technology University, Noida, INDIA*
richa.gupta@jiit.ac.in
[2]*IIT Kanpur, INDIA*
venkats@iitk.ac.in

Zermelo Frankel Set Theory[3] has been used as a platform to obtain a set-theory level formulation of Signals and System Theory[2]. Our general framework for signal and system

theory will comprise the domain **D** and the range **C**, taken to be unstructured nonempty sets, and different signals (functions) in the signal space **S** defined as different maps $s : \mathbf{D} \to \mathbf{C}$. Thus, $\mathbf{S} = \{s : \mathbf{D} \to \mathbf{C}\}$. Next a processor (operator) as a map $p : \mathbf{S} \to \mathbf{S}$. The space of all possible processors is thus defined: $\mathbf{P} = \{p : \mathbf{S} \to \mathbf{S}\}$.

The topological characterization of an arbitrary processor is preceded by the development of a theory of complex sets. The most important definition of a preservance topology of order n of a processor is made. A definition of quasinclusion as a generalization of subinclusion (as developed in the thesis for sets of equal rank) now applicable to any two sets of arbitrary rank is the starting point of the development[2]. Quasi-union and quasi-intersection may be defined along lines similar to their conventional counterparts, except for using quasinclusion rather than ordinary inclusion as the basis. Some other important definitions of the complex set theory (sub inclusion based set theory) like Quasi-Power set, Quasi-equivalence are also pointed out[1].

References:

[1]. Richa Tayal, "Processor Composition, Complex Sets and Hyper processing", M.Tech thesis, IITK, July 2005.

[2]. Venkatesh K. Subramaniam, "Signals and Systems on Sets", PhD thesis, IITK, October 1994.

[3]. Kuratowki K., Mostowski A., "Set Theory", Vol. 1. North Holland, 1966.

A New Class of Exponential Entropies

Rajkumar Verma[1] and Bhu Dev Sharma[2]
Jaypee Institute of Information Technology University, Noida, INDIA
[1]rkver83@gmail.com
[2]bhudev.sharma@jiit.ac.in

Entropy has been a key measures in studies related to Information theory and its many applications. Shannon's entropy (1948) involved logarithmic function. Campbell (1966) for the first time recognized that the exponential entropy is a measure of spread of the associated probability distribution. This idea gives a new dimension to entropy, exponential entropy being a measure of 'extent' of probability distribution. Exponential entropy has thereafter been a subject of wider study.

Also, there is rich literature on generalizations of Shannon's entropy given by Renyi (1961), Havrda and Charvat (1967), Sharma and Mittal (1975), Sharma and Taneja (1975) etc. Pal and Pal (1989) introduced a new definition of exponential entropy. Some generalizations of the exponential entropy have been studied by Kvålseth (2000). In this paper, a very general class of exponential entropies involving two parameters is introduced and studied. This class significantly widens the study of exponential entropies. Paper studies their properties, connections to other entropies and a characterization.

References:

L.L.Campbell, "Exponential Entropy as a Measure of Extent of Distribution", Z. Wahrsch., 5, 1966, pp. 217- 225.

J.H. Havrda and F. Charvat, "Quantification Methods of Classification Processes: Concept of Structural a Entropy," Kybenetica, 3, 1967, pp. 30-35.

T.O. Kvålseth, "On Exponential Entropies", IEEE International Conference on Systems, Man, and Cybernetics, 4, 2000, pp. 2822-2826.

N.R. Pal and S.K. Pal, "Object-Background Segmentation Using New Definitions of Entropy," IEEE Proceedings, 136, 1989, pp. 284-295.

A. Rényi, "On Measures of Entropy and Information," Proceedings of the Fourth Berkeley Symposium on Mathematical Statistics and Probability, Berkeley, CA: University of California Press, 1961, pp. 547-561.

C.E. Shannon, "A Mathematical Theory of Communication," Bell System Technical Journal, 27, 1948, pp. 379-423,623-656.

B.D. Sharma, I.J. Taneja, "Entropy of Type (α, β) and Other Generalized Measures in Information Theory", Metrika, 22, 1975, pp. 205-215.

B.D. Sharma., D.P. Mittal, "New Non-additive Measures of Entropy for Discrete Probability Distributions", Journal of Mathematical Sciences, 10, 1975, pp. 28 - 40.

Forum for Interdisciplinary Mathematics

The Forum is a registered trust in India. It is, in effect, an India based international society of scholars working in mathematical sciences and its partner areas (a partner area is defined as one where some knowledge of mathematical sciences is desirable to carry out research and development). The society was incepted in 1975 by a group of University of Delhi intellectuals led by Professor Bhu Dev Sharma. The forum has been conducting international conferences in India and abroad.

Jaypee University of Information Technology (JUIT)

The Government of Himachal Pradesh being desirous of creating facilities for education, training, and research in the emerging areas of technology including Information Technology in the State of Himachal Pradesh, entered into an agreement for collaboration with Jaiprakash Sewa Sansthan (JSS), New Delhi, a registered Trust, which has a major objective among others, of creating education facilities at all levels.

Jaypee University of Information Technology has been set up by Act No. 14 of 2002 vide Extraordinary Gazette notification of Government of Himachal Pradesh dated May 23, 2002 and is approved by the University Grants Commission under section 2(f) of the UGC Act.

The Governor of Himachal Pradesh is the Chancellor and the Managing Trustee of Jaiprakash Sewa Sansthan is the Pro-Chancellor of the University.

Objectives

One major aspect of this conference is that it will serve as a vehicle to groom young researchers including undergraduate, graduate students and the recent recipients of PhD degrees. These young researchers will be encouraged to make regular oral presentations and will not be restricted to making only poster presentations.

The conference will feature separately a section on student paper competition. A selection panel will judge the presentations and make recommendations for awards.

In addition, the conference will devote a session on "Editors Round Table" to help scholars appreciate the "current trends and techniques" of scholarly publications.

Patrons

Chief Patron
Jaiprakash Gaur
Founder - JSS

Patron
Manoj Gaur
Pro-Chancellor, JUIT

International Advisory Committee

Professor Chris Roger
Scharnagel Professor of Mathematical Sciences,
Auburn University, USA
rodgec1@auburn.edu

Professor Petr Girg
University of West Bohemia
Univerzitní 22, Plzeň, CZ-30614, Czech Republic
pgirg @ kma.zcu.cz

Professor Takakazu Sugiyama
Chuo University, Japan
takakazu@math.chuo-u.ac.jp

Professor Adimurthi
TIFR Centre for Applicable Mathematics
Bangalore 560 064, India
aditi@math.tifrbng.res.in

Professor Phoolan Prasad
Indian Institute of Science, Bangalore 560 012, India
prasad@math.iisc.ernet.in

Professor Dulal Bhaumik
University of Illinois, Chicago, Illinois, USA
dbhaumik@uic.edu

Professor O P Singh
Institute of Technology
Banaras Hindu University, Varanasi 221 005, India
opsingh.apm@itbhu.ac.in

Professor Neeraj Misra
Indian Institute of Technology Kanpur
Kanpur 208 016, Uttar Pradesh, India
neeraj@iitk.ac.in

Conference Co-Chairs

Satya Mishra
University of South Alabama, Mobile, AL 36688, USA
mishra@jaguar1.usouthal.edu

Harinder Singh
JUIT Waknaghat, Solan 173 215 (HP) India
harinder.singh@juit.ac.in

Conference Organizing Committee

Satya Mishra (Chair)
University of South Alabama, Mobile, AL 36688, USA
mishra@jaguar1.usouthal.edu

Mark Carpenter
Auburn University, USA carpedm@auburn.edu

Bal Kishan Dass
University of Delhi, India dassbk@rediffmail.com

Chandra M. Gulati
University of Wollongong, Australia
cmg@uow.edu.au

Bhu Dev Sharma
JIIT University, Noida, India sharmaforum@yahoo.com

Bin Wang
University of South Alabama, USA
bwang@jaguar1.usouthal.edu

Local Organizing Committee

Harinder Singh (Chair)
+91-1792-239207 harinder.singh@juit.ac.in

Brig (Retd.) Balbir Singh
+91-1792-239203 balbir.singh@juit.ac.in

Karanjeet Singh
+91-1792-239259 karanjeet.singh@juit.ac.in

R. S. Raja Durai
+91-1792-239209 rsraja.durai@juit.ac.in

Archan Bhattacharya
+91-1792-239258 archan.bhattacharya@juit.ac.in

R. K. Bajaj
+91-1792-239229 rakesh.bajaj@juit.ac.in

Gaurav Garg
+91-1792-239360 gaurav.garg@juit.ac.in

Call for Papers

The academic programme of the conference will consist of plenary talks, symposia and paper presentation in the following areas:

- Information, Coding Theory and Applications
- Statistical Inference
- Biostatistics
- Computational Fluid Dynamics
- Environmental Statistics
- Fuzzy Set Theory and Applications
- Graph Theory, Harmonic Analysis and Wavelets
- Ordinary and Partial Differential Equations
- Mathematical Methods for Signal Processing
- Operations Research
- Statistical and Mathematical Methods in Engineering
- Mathematics, Systems and Robotics
- Cryptography
- Mathematical and Computational Biology
- Prediction, Time Series and Stochastic processes
- Statistical Modeling for Medical Research

Research Papers in other relevant fields will also be welcome.

Paper Submission

Abstract of the paper, limited to 300 words, is to be uploaded through conference website.

Registration

At least one author must register for the paper to be included in the academic programme.

One can register online at conference website.

Delegate	Before May 31, 09	Extra after May 31, 09
Foreign	USD 200*	USD 50
Indian	INR 3000*	INR 500
Foreign Students	USD 150*	USD 50
Indian Students	INR 2000*	INR 500
Each Companion		
Foreign Delegates	USD 100	
Indian Delegates	INR 1500	

Registration charges include all conference material, coffee breaks, and meals during conference days.
*For current members of FIM delegation fee is 80%.

Payment of Registration Fee

Participants can use one of the following modes for paying registration fee:

(a) Demand Draft: Demand Draft should be in favor of "Jaypee University of Information Technology" payable at Shimla, Himachal Pradesh, India.

(b) Multicity Cheque: Participants from within India can also make payment through Multicity Cheque payable at par in the name of "Jaypee University of Information Technology, Waknaghat"
Demand Draft/Cheque along with Registration form duly completed should be sent to:
Registrar
(IMST 2009 – FIM XVIII)
Jaypee University of Information Technology
Waknaghat, District Solan 173 215
Himachal Pradesh, India.

(c) Wire Transfer: Participants/authors from outside India can also pay registration fee through Wire Transfer using the following information:

RECEIVING BANK	PUNBINBBPAR
RECEIVING BANK	PUNBINBBCHA
CORRESPONDENT	A/c 36083055 with
	Swift Code CITI US 33
	CITI BANK NEW YORK
ACCOUNT WITH BRANCH	PUNJAB NATIONAL BANK, B.O. THE MALL, SHIMLA
NAME OF THE BENEFICIARY	JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY
ACCOUNT NO. OF BENEFICIARY	0427002100682105

Note:
Please mention the name of the remitter (Participant/Author) and also the Purpose of remittance (Registration fees IMST 2009-FIM XVIII) clearly in the funds transfer application.
Swift Copy (wire transfer advice) should be emailed to imst2009@yahoo.in for information to the organizers.
All bank charges will be on the account of the remitter.
In all cases a copy of the completed registration form should be sent by e-mail to imst2009@yahoo.in for information.

Important Dates

Paper submission: up to May 31, 2009
Regular Registration: up to May 31, 2009
Late Registration: June 1-30, 2009

Accommodation

Free:
All participants shall be offered accommodation in University hostel(s) (shared if the participation is large).
Paid:
The Destination: (7 km). The conference discount is 20% for single and 30% for double occupancy.
Falcon Crest: (10 km). The conference discount is 30%.
Transport shall be provided from both these hotels.
Participants, if they so desire, can make their independent reservations in hotels of their choice.

How to Reach

Convenient airports are Shimla (30 Km), Chandigarh (100 Km), New Delhi (350 Km) and Amritsar (350 Km).
All buses from Delhi, Chandigarh (ISBT, Sec 43), and other places to Shimla drop and pick passengers from Waknaghat.
Direct trains from Delhi and other places are available upto Kalka (70 Km). After that one can hire taxi or board a bus to Waknaghat.
One can also choose to travel by Kalka-Shimla Heritage Toy Train up to Kandaghat (12 Km from JUIT).

General Information

The University is situated in the neighborhood of Shimla, 3 KM off the NH22 (Ambala-Kalka-Waknaghat-Shimla road). It is just half an hour drive to Shimla from campus. The nearby places of tourist attractions are Shimla (24 km), Chail (45 km), Kufri (45 km), Kasauli (50 km) and many more.

IMST 2009 – FIM XVIII
Phone: +91-1792-239207, Fax: +91-1792-245362
http://www.juit.ac.in/IMSTFIM2009/imst_fim_2009.htm

IMST 2009-FIM XVIII

AUGUST 2-4, 2009

Forum for Interdisciplinary Mathematics

शास्त्राणां गणितं मूर्धनि स्थितम् ।
Mathematics is at the zenith of all disciplines

Eighteenth International Conference
of
Forum for Interdisciplinary Mathematics
on
Interdisciplinary Mathematical and Statistical Techniques

Organized by

Jaypee University of Information Technology
Waknaghat 173 215
Himachal Pradesh, India

Jaypee University of Information Technology

Waknaghat, Distt. Solan (Himachal Pradesh), India

shall host

Eighteenth International Conference of Forum for Interdisciplinary Mathematics on *Interdisciplinary Mathematical and Statistical Techniques*

(IMST 2009-FIM XVIII)

During August 2-4, 2009

The Forum was incepted in 1975 and is a registered trust in India. It is, in effect, an India based international society of scholars working in mathematical sciences and its partner areas (a partner area is defined as one where some knowledge of mathematical sciences is desirable to carry out research and development).Right from the beginning, FIM had the support and association of India's great mathematicians and also users of mathematics from different disciplines in the country and abroad.

The Government of Himachal Pradesh being desirous of creating facilities for education, training, and research in the emerging areas of technology including Information Technology in the State of Himachal Pradesh, entered into an agreement for collaboration with Jaiprakash Sewa Sansthan, New Delhi, a registered Trust, which has a major objective among others, of creating education facilities at all levels.

Jaypee University of Information Technology, Waknaghat has been set up by Act No. 14 of 2002 vide Extraordinary Gazette notification of Government of Himachal Pradesh dated May 23, 2002 and is approved by the University Grants Commission under section 2(f) of the UGC Act.

The Governor of Himachal Pradesh is the Chancellor and the Managing Trustee of Jaiprakash Sewa Sansthan is the Pro-Chancellor of the University.

One major aspect of this conference is that it will serve as a vehicle to groom young researchers including both undergraduate/graduate students and recent recipients of PhD degrees. These young researchers will be encouraged to make regular oral presentations and will not be restricted to making only poster presentations.

The conference will feature separately a section on student paper competition. A selection panel will judge the presentations and make recommendations for awards.
In addition, the conference will devote a session on "Editors Round Table" to help scholars appreciate the "current trends and techniques" of scholarly publications.

Call for Papers

The academic programme of the conference will consist of plenary talks, symposia and paper presentation in the following areas:

- Information, Coding Theory and Applications
- Statistical Inference
- Biostatistics
- Computational Fluid Dynamics
- Environmental Statistics
- Fuzzy Set Theory and Applications
- Graph Theory, Harmonic Analysis and Wavelets
- Ordinary and Partial Differential Equations
- Mathematical Methods for Signal Processing
- Operations Research
- Statistical and Mathematical Methods in Engineering
- Mathematics, Systems and Robotics
- Cryptography
- Mathematical and Computational Biology
- Prediction, Time Series and Stochastic processes
- Statistical Modeling for Medical Research

Research Papers in other relevant fields will also be welcome.
For more information regarding submission of papers, registration and accommodation etc., please visit the conference website

http://www.juit.ac.in/IMSTFIM2009/imst_fim_2009.htm

Registration form and Brochure can be downloaded from the website.

Conference Co-Chairs

Satya Mishra
Department of Mathematics and Statistics
University of South Alabama,
Technology
Mobile, AL 36688, USA
mishra@jaguar1.usouthal.edu

Harinder Singh
Department of Mathematics
Jaypee University of Information

Waknaghat 173215 HP India
harinder.singh@juit.ac.in

PS:

Please forward this email to your friends and colleagues who may like to attend the conference