Global Scientific Guild

# Global Scientific Guild Conference

## Abstract Book

# Global Webinar on Applied Science, Engineering and Technology

April 12-13, 2021

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www.globalscientificguild.com/applied-science-webinar

# Upcoming Events

**Global Webinar on Toxicology and Applied Pharmacology**

May 10-12, 2021 Live Webinar

**Global Webinar on Nursing**

July 02-04, 2021 Live Webinar

**Global Webinar on Materials Science and Engineering**

May 24-26, 2021 Live Webinar

**Global Webinar on Occupational Health & Safety**

July 09-11, 2021 Live Webinar

**3rd Global Webinar on Traditional and Alternative Medicine**

July 16-18, 2021 Live Webinar

**2nd Global Webinar on Forensic Science**

July 23-25, 2021 Live Webinar

**Global Webinar on Public Health**

August 06-08, 2021 Live Webinar

**Global Webinar on Laser, Optics and Photonics**

August 13-15, 2021 Live Webinar

**Global Webinar on Nanotechnology**

August 20-22, 2021 Live Webinar

Global Webinar on
Applied Science, Engineering and Technology

April 12-13, 2021

# Day-1

**N.Ranganathan**
*Emeritus Professor, Former Director Laboratory of Mechanics and Rheology, University of Tours, France*

## Variable Amplitude Fatigue in Selected Aluminium Alloys

Fatigue crack growth behavior of selected aluminum alloys under variable amplitude loading is discussed in this study, based principally on experimental observations. The tests include single overloads tests in different environments, and tests using an aircraft wing loading spectrum. It is shown that conditions favoring a planar slip behavior lead to very high delays as opposed to conditions leading to multiple slip behavior. An anomalous effect is observed in an aluminum Lithium alloy.

**Biography:**

Professor Narayanaswami Ranganathan was born and schooled in New Delhi He later attended IIT Madras (1965 – 1970) where he graduated as an aeronautical engineer. He worked with the Indian Civil Aviation Department (R&D Directorate) in New Delhi until 1976 when he migrated to Poitiers, France. He completed his Docteur-Ingénieur degree in 1979, and was awarded the Doctor of Sciences degree from the University of Poitiers in the field of Solid State Mechanics in 1985. Following this he was in Poitiers until 1996, working as an associate Professor at the E.N.S.M.A aeronautics school. He was nominated Professor at the University of Tours in 1997 and after retirement, he is nominated as Emeritus Professor In 2017. Professor Ranganathan was the head of the laboratory of mechanics and rheology at the university from the year 2000 to 2017..In 2005 he created CEROC, a hybrid research center split between university and industrial research focusing on cutting tools. This was followed be a second hybrid center, CERMEL in 2007 which is a center on elastomers. His research interests are in materials fatigue, nanocharacterization of material behavior and fracture mechanics and he has more than 120 research publications in these fields. He has given talks in related fields all over Europe and the United states, and also at prestigious universities like Cambridge University, University of Trondheim, Chalmers's University, University of Lodz, University of Opolé, Columbia University, University George Washington in Missouri, University of Waterloo, IIT Madras, IIT Delhi, SRM University, Anna University and Vellore Institute of Technology to name a few. He was visiting professor at Ecole Polytechnique Montréal, Canada in 1993 and currently he is overseas Professor at Anna University, SRM University and VIT University in Tamil Nadu, India He has been awarded the title of " Chevalier dans l'ordre des Palmes académiques " for his achievements in the academic fields, by the French Government in 2012.

**Shigeo Akashi and Yao Tong**
*Department of Information Sciences, Faculty of Science and Technology, Tokyo University of Science, Japan*

## On intentional network traffic congestions brought about by packet storms targeting bottlenecked links

Network traffic congestions are one of the most troublesome problems from which a large number of network users suffer in several ways such as packet disappearance and disconnection of mutual communication among the authenticated network users. Since these congestions differ themselves from the other network faulures in that they are hard for the network administrators to specify the causal network skills and to repair these cingestiobs. Though almost all network traffic congestions are believed to happen spontaneously, it is known that there exists intentional network traffic congestions accompanying the distributed denial-of-service attack. Since there exist two cases of the network traffic congestions, one of which is spontaneous ones and the other of which is intentional ones, the first procedure which should be followed by the network administrators is to clarify which case of the congestion has been observed. Moreover, it is also known that the intentional network traffic congestions can be classified more precisely, according to the difference between the network tools shot at by the cybercriminals, as the following:

**Case 1:** Intentional network traffic congestions brought about by shooting at servers such as web servers and DNS servers, which are famous for the distributed denial-of-service attacks.
Case 2: Intentional network traffic congestions brought about by shooting at bottlenecked links for the purpose of making several certain network segments isolated from the Internet.

In this talk, we show that the causal network skills bringing about Case 2 result in malicious combination of static routing protocols and demostrate how the congestions explained in Case 2 is brought about artificially.

**Biography:**

Prof. Shigeo Akashi is affiliated with the Department of Information Sciences of the Faculty of Science and Technology at Tokyo University of Science. He was a Chair Professor ot the department from 2015 through 2017 and has been approved as Distinguished Cisco Certified Active Instructor, which is authorized by Cisco Networking Academy since 2013. His major research areas are applied mathematics and network theory. He has been being a member of the Experts Committee leading scientific education for Japanese senior high schools, which is authorized by Ministry of Education, Culture, Sports, Science and Technology of Japanese Government since 2016.

Dr. Yao Tong is affiliated with the Department of Information Sciences of the Faculty of Science and Technology at Tokyo University of Science. Her major research area is cybersecurity. She has been being a member of the Experts Committee leading scientific education for Japanese senior high schools, which is authorized by Ministry of Education, Culture, Sports, Science and Technology of Japanese Government since 2019.

**Soshu Kirihara**
*Osaka University, Japan*

## Stereolithographic Addive Manufactuirng of Practical Materials Components

In stereolithographic additive manufacturing (STL-AM), 2-D cross sections were created through photo polymerization by UV laser drawing on spread resin paste including nanoparticles, and 3-D models were sterically printed by layer lamination. The lithography system has been developed to obtain bulky ceramic components with functional geometries. An automatic collimeter was newly equipped with the laser scanner to adjust beam diameter. Fine or coarse beams could realize high resolution or wide area drawings, respectively. As the row material of the 3-D printing, nanometer sized metal and ceramic particles were dispersed in to acrylic liquid resins at about 60 % in volume fraction. These materials were mixed and deformed to obtained thixotropic slurry. The resin paste was spread on a glass substrate at 50 μm in layer thickness by a mechanically moved knife edge. An ultraviolet laser beam of 355 nm in wavelength was adjusted at 50 μm in variable diameter and scanned on the spread resin surface. Irradiation power was changed automatically for enough solidification depth for layer bonding. The composite precursors including nanoparticles were dewaxed and sintered in the air atmosphere. In recent investigations, ultraviolet laser lithographic additive manufacturing (UVL-AM) was newly developed as a direct forming process of fine metal or ceramic components. As an additive manufacturing technique, 2-D cross sections were created through dewaxing and sintering by UV laser drawing, and 3-D components were sterically printed by layer laminations with interlayer joining. Though the computer aided smart manufacturing, design and evaluation (Smart MADE), practical materials components were fabricated to modulate energy and material transfers in potential fields between human societies and natural environments as active contributions to Sustainable Development to Goals (SDGs).

**Biography:**

Soshu Kirihara is a doctor of engineering and a professor of Joining and Welding Research Institute (JWRI), Osaka University, Japan. In his main investigation "Materials Tectonics" for environmental improvements of "Geotechnology", multi-dimensional structures were successfully fabricated to modulate energy and materials flows effectively. Ceramic and metal components were fabricated directly by smart additive manufacturing, design and evaluation (Smart MADE) using high power ultraviolet laser lithography. Original stereolithography systems were developed, and new start-up company "SK-Fine" was established through academic and industrial collaboration.

**Chien-Yuan Chen**
*National Chiayi University, Taiwan*

# Earth Dam Failure Procedure Monitoring by Using Infrared Thermal Imager

An infrared thermal imager is applied for earth dam progressive failure procedure monitoring. Infrared thermography can monitor object's surface radiation temperature change. It is a non-destructive testing method to monitor the internal material changes that reflect on the surficial radiation temperature. The field large scale earth dam experimental test site is located in the Huisun forest farm, Nantou County. The water seepage caused the earth dam soil to be wet, as can be reflected by thermography. The infrared thermography analysis found different zones with larger surficial radiation temperature differences. The failure zone was found to coincide with dramatic changes in radiation temperature recorded using thermography. Earth dam surficial areas with large radiation temperature variations could be potential failure areas to speculate the dam failure mode.

**Biography:**

Chien-Yuan Chen was born in Taiwan. He has completed his Ph.D. in Civil & Environmental Engineering, University of Southern California, Los Angeles, USA, 2001 and M.Sc. in Civil Engineering, National Cheng Kung University, Taiwan, 1995. He was Associate Research Fellow (2001-2006) at Slopeland Disaster Reduction Division, National Science and Technology Center for Disaster Reduction (NCDR), Sindian District, New Taipei City, Taiwan. He was Assistant Professor (2006-2009) and Associate Professor (2009-2013) at Department of Civil and Water Resources Engineering, National Chiayi University. He is currently as Professor (since 2013) at Department of Civil and Water Resources Engineering, National Chiayi University, Chiayi City, Taiwan.

**Mervat El-Hoz**
*University of Balamand, Lebanon*

## Sustainable Water Management and Its Link to Global Climate Change

Climate change affects the distribution of water supplies (temporal and spatial) and the sea level in many countries of the world. Its effects also mess up the reliability of the water supply and the water supply system operations. Water supply collections and processes must be adjusted under physical, hydrological and policy constraints by local water managers to meet sustainable water demand especially in countries experiencing water shortages. Water resource conservation strategies and sustainable technologies such as innovation in systems, products and services are taken into consideration. Also, engineering and economic models that optimize and allocate water supply processes are used to explore impacts on water supplies from an extremely hot dry climate and high sea level rise, and to identify economically promising long-term adaptations of water systems. Modeling can suggest that even under fairly severe forms of climate change, water demand can be met, but at a cost from purchasing water from agricultural users to urban areas, more expensive water supply alternatives such as water recycling and desalination, and some increases in scarcity. Water (costs to reduce water use). In addition, implementation of operational flexibility by water providers and regulators is essential. Water conservation, water treatment methods, desalination, and water recycling improve system performance and enhance flexibility in the management of water supply.

**Biography:**

Experienced Professor with a demonstrated history of working in the higher education and consulting industry. An Environmental Engineer skilled in Waste Management, Water and Wastewater Treatment, Water Resource Management, & Air Pollution Control. Strong education professional graduated from University of Sydney, Australia; and Middle East Technical University, Turkeyand 60000 exhibits are reported.

**Marek Smieja**
*Jagiellonian University, Poland*

## Machine learning in science and engeneering

Machine learning is a set of mathematical and algorithimc tools, which allows computers to make successful predictions using past experiences. Machine learning models exhibits impressive performance in various real-life tasks and have been widely employed in science, industry, economics, and many other areas. This presentation covers a brief tour through basic paradigms of machine learning and its applications. First, we define what is machine learning and how to use it. Next, we recall a few real-world applications. Finally, we present a taxonomy of machine learning techniques and discuss an application of machine learning in predictive maintenance.

**Biography:**

Marek Śmieja received a master's degree in mathematics and a Ph.D. degree in computer science from the Jagiellonian University, Krakow, Poland, in 2009 and 2015, respectively. In 2019, he was a postdoctoral researcher at Instituto de Telecomunicações, Instituto Superior Técnico, Universidade de Lisboa, Portugal. Currently, he works as an Assistant Professor at the Institute of Computer Science and Computational Mathematics, Jagiellonian University, Kraków. His research interests cover deep learning methods in unsupervised and semi-supervised learning.

**R. Zhang**
*UCL, Belgium*

## The Generation Of Unit P2 Meshes Error Estimation And Mesh Adaptation

We propose a new framework for the generation and adaptation of unit unit P2 meshes in 2D, which are curvilinear meshes, and can be used to capture curved geometries and features of solutions. We start from an arbitrary analytic function f(x; y) whose _rst, second and third derivatives are known exactly. We _rst build a metric _eld based on the knowledge of f and its derivatives up to order 3. With the aim of creating right-angled triangles, we choose to create edges that are locally orthogonal. The two curvilinear edge directions that are chosen are iso-values of f and the steepest descend of f which are locally equal to rf and r?f. Interpolation error is then computed along with those curvilinear directions and mesh sizes are determined in order to build unit length edges. Those pieces of information allow building the mesh metric based on f and its derivatives. Then, a unit P2 mesh is generated with respect to this metric, i.e. one where each edge has an adimensional length 2 [0:7; 1:4]. Generating unit straight-sided meshes is a problem that has been largely studied, both from a theoretical and an application perspective. Here, our aim is to allow edges to become curved, leading to unit meshes that would potentially contain fewer triangles.
We _rst generate the points in a frontal fashion. In that process, we ensure that (i) two points xi and xj are never too close to each other and (ii) that there exist four points xij(j = 1; 2; 3; 4) in the vicinity of each point xi that are not too far to xi, i.e. that can form edges in the prescribed range [0:7; 1:4]. Then, points are connected in a very standard isotropic fashion. The mesh is subsequently modi_ed using straight edge swapping, straight edge curving, curvilinear edge swapping in order to form the desired unit mesh. A curvilinear mesh quality criterion is proposed that allows driving the edge swapping process. Finally, we obtain a unit curvilinear mesh contains only valid \Geodesic Delaunay triangles". We test several examples to demonstrate the mesh adaptation procedure. From these examples, we see that our curvilinear mesh generation and adaptation algorithm can capture the character of analytic functions. And we implement a mesh adaptation method for P1 elements using the same methodology to compare with the curvilinear mesh. Then we analyze the interpolation error with respect to the

obtained metric for both. Our results give a signi_cant error reduction (about 50%), showing that our meshing technique allows interpolating functions in a way better fashion.

**Jose Carlos Vieira Sa**
*Polytechnic of Porto, Portugal*

## Does the Lean Six Sigma philosophy have any impact on the safety of organizations?

Lean Six Sigma is a philosophy that combines Lean and Six Sigma strategy to reduce costs and improve the efficiency of companies by reducing process variability and eliminating waste and activities that do not add value. This is a philosophy used in various industries, whose success depends primarily on the involvement of management, employees, and a commitment to improving customer satisfaction. But when the focus is on productivity and process optimization, keeping employees safe and involved can be a challenge. Thus, it is important that the implementation of continuous improvement tools, consider aspects related to Safety, since the occurrence of incidents can interrupt the activity and endanger the entire performance of the companies.

The objective of this project was to evaluate how the implementation of these philosophies has an impact on Occupational Health and Safety, especially if the maturity of an improvement system can affect the safety culture of the company. To this end, a conceptual model was developed to relate the maturity of the implementation of Lean Six Sigma tools to the safety culture of companies. The model was validated by conducting a questionnaire addressed to companies implementing Lean or Six Sigma tools.

A survey of companies was carried out and obtained 70 responses, corresponding to 70 organizations. The statistical study carried out on the results obtained with the survey allowed us to prove the survey's reliability, since the value obtained with Cronbach's alpha was 0.92. It was not possible to prove statistically, that the maturity of the implementation of Lean Six Sigma tools is related to higher levels of safety culture. However, this study allowed us to conclude that the companies, mainly from the Portuguese industrial sector, that participated in the sample, use mainly the tools 5S, Visual Management, Standard Work, Daily Kaizen and Kanban, and that certification in ISO 45001 and 14001 is positively related to the safety culture of the organizations.

**Jeff Seaman**
*Point Park University, USA*

## Computer Science and Applications

Computer Science and Applications is more than an App on the app store or play store. People are drawn to apps and the idea of coming up with that next big idea that will break the bank for them. When you introduce the word computer science, they don't know the meaning, just that it's an app, but what is an app.
Before thinking about creating a mobile application, website, etc; computer science needs to be
taken back to the important principles that will get you to your destination. What is the motivation, why does the individual care about the problem and results, what is the problem statement, what problems need to be solved, what is the approach on how to solve the problem statement.
These are scenarios that need to be answered before you can begin to write your source code and be that next rockstar of the app world. The discussion will be around what makes up computer science, how is it taught in the education field, the outcomes that it provides..

**Biography:**

I have earned my undergrad degree from the University of Arizona in Computer Science, and graduate degrees from Robert Morris University in the same field of study. I didn't start my education path off like most, I took some time off after my first year of college, and started to work in the industry as a Software Engineer with no formal education, and my knowledge was based on what I read in books and self-taught myself, as I worked in the industry. Five years later is when I had decided it was the right choice to go through and complete my education. In which at this time it was based on doing this with a family of five. Working full-time and attending school in the evenings full-time was not the easiest of methods, I learned more on how to manage multiple roles and responsibilities in a single period compared to what I would have learned not being in that situation. I have spent 21 years working in the Information Technology industry primarily as a Software Engineer, Architect, and in the management sector. I started teaching computer science as an Adjunct Professor at both Allegheny College in Pittsburgh, PA, and West Liberty University, in West Liberty, WV. Since 2018 I have been a full-time assistant professor of Applied Computer Science at Point Park University. I've served as the Director of Information Technology at a local youth organization for five years in a volunteer role. I was able to take my experience and turn around an establishment that thrived on pens and papers to the digital world.

Moved all of their registrations, items they were selling to a mobile app for both android and IOS and on a website. In addition to other volunteer opportunities that I had started and organized city wide user groups around various programming languages. This was an outlet to allow developers to network, help each other, provide guest speakers such as CEO's, other developers, authors etc; in addition to having students from local universities network and get a lay of the land. I was able to get Microsoft and Google to be sponsors of what we were doing and provide financial backing to help with our meetings.

**Mijia Yang**
*Department of Civil and Environmental Engineering,*
*North Dakota State University*

## Comparison of pore structure in alkali activated fly ash geopolymer and ordinary concrete due to alkali-silica reaction using micro-computed tomography

Alkali-Silica reaction (ASR) is a deleterious chemical reaction in concrete and manifests itself through pore structure changes. Alkali activated fly ash geopolymer concrete is a new type of green concrete that forms binder through alkali activated materials without using Portland cement. However, due to the alkali solution used, alkali activated fly ash geopolymer concrete is naturally susceptible to ASR. In this seminar, the speaker will present his research on evaluation of ASR effect through tracing pore distribution and its change with time in concrete using microcomputed tomography (Micro-CT). Through Micro-CT images, it is found that ASR in fly ash geopolymer concrete is less severe than its ordinary Portland cement concrete counterpart, since the pore distribution in fly ash geopolymer concrete is more uniform and does not change with time, while increasing sizes of pores are found in the ordinary Portland cement concrete.

**Biography:**

Prof. Mijia Yang completed a BSCE degree and then worked for one year as a field engineer at a mine construction company. He continued pursuing graduate study in Geotechnical Engineering and came to US in 2001. He completed his Ph.D. study at University of Akron in 2006 and worked as a post-doctoral research associate at University of Nebraska-Lincoln before moving to the University of Texas at San Antonio as an assistant Professor in Structural Engineering. Professor Yang joined North Dakota State University in the department of civil engineering at 2011, where he led multiple projects on structural health monitoring, innovative concrete material, and accelerated pavement repairs. He is licensed as a Professional Engineer (license number 70246) in Ohio.

**Hossein Noorvand**
*Arizona state University, USA*

## Fiber Reinforced Asphalt Concrete: Overview, Mechanism, and Application

Fiber Reinforced Asphalt Concrete (FRAC) mixtures continue to receive great attention from many transportation agencies world-wide because of their ability to improve pavement performance. A number of studies reported on the properties and characteristics of FRAC in terms of improved rutting, cracking, and raveling. Several agencies in the U.S. and countries around the world have used, or are in the process of using FRAC mixtures in new pavement designs and rehabilitation programs. This presentation highlights findings from several research studies conducted at Arizona State University. The engineering properties and Life Cycle Cost Analysis of FRAC mixtures are discussed along with a demonstration on how to use them in current pavement design procedures.

**Biography:**

Hossein Noorvand has completed his PhD from the Department of Civil, Environmental and Sustainable Engineering at Arizona state University. He is currently working as a postdoctoral research scholar in pavement and materials program at Arizona state University. His primary areas of research are sustainable concrete materials, fiber-reinforced composites, and pavement design and evaluation. Dr. Noorvand has specifically worked on development of a framework and a generalized theory for evaluating the fundamental mechanism of mechanically fiber reinforced asphalt concrete.

**Dr. Faisal Arain**
*Northern Lakes College (NLC), Alberta, Canada*

## Emerging Trends in Sustainability Practices in the Canadian Construction Industry

Sustainability in all aspects of our life is certainly an emerging trend. All industries including Construction Industry are taking active initiatives to support sustainability practices. Construction always has been a major player in Canada's economy. In the global economy, construction occupies a still larger position. Around the world this industry accounts for $8 trillion a year of economic activity or about 15% of the world's GDP. Moreover, this amount was projected to grow to $12.9 trillion by 2022. During this time period, Canada is expected to move from seventh to fifth place in terms of the world's largest construction market. This emphasizes the need for aptly trained professional in all domains of sustainability.

Sustainable development issues and environmental concerns are becoming popular with Canada's construction industry's ever increasing activities. Contemporary construction practices adhere to traditional methods of construction; negative environmental impact during and after construction phase is certainly an area of interest for construction professionals. Technological advancements in the engineering and construction industry is contributing to achieving sustainable construction practices, however industry has been complaining regarding lack of training/education to produce construction professionals with sustainability competencies. There is a growing need for construction professionals with sustainability skillsets, which are crucial for enhancing sustainability practices, especially given the growing complexity of construction projects and construction-related environmental law. Academic institutions have a responsibility to address this emerging need of the industry to support national economy.

The presentation will discuss the sustainability practices and identify the need for an applied training program in sustainability. The study also identifies emerging trends in sustainability practices in the industry. This forms the basis for a proposed applied program for training professionals to address emerging needs of the industry in the sustainability domain.

The study suggests that an applied program in sustainability will help training young professionals better to address the needs of sustainability professionals in the local and global built environment industries that await them. The presentation would be of interest to sustainability

experts, construction professionals, and faculty involved with sustainable built environment education.

**Biography:**

Dr. Faisal Manzoor Arain is an experienced academic leader and architect with an MS and PhD in Construction Project Management. He has extensive experience of working at management and leadership positions in industry and academia in Pakistan, Saudi Arabia, Singapore and Canada. Dr. Arain received a certificate from Harvard University, Boston, USA upon completion of the Leadership Development Program. He led the development of Canada's first Bachelor of Science in Construction Project Management at SAIT, Calgary, Alberta. He was appointed by the Saskatchewan Higher Education Quality Assurance Board (Ministry of Education, Saskatchewan) as the Chair of the quality review panel for new program evaluations.

Dr. Arain has consulted, researched and published widely in the discipline of Project Management and Design and Construction Management. He has authored over 120 research publications, 2 book chapters, and 13 books (http://www.amazon.com/-/e/B0028ORPJK). His research interests include leadership, project management, designing educational spaces, design and construction interface issues, and the development and application of knowledge-based systems for management of building projects. Dr. Arain is the recipient of numerous awards including the Donald S. Barrie Award 2005 conferred by Project Management Institute (PMI) USA, and the Idahlynn Karre Exemplary Leadership Award 2016, conferred by the Chair Academy, USA. Dr. Arain serves on editorial boards of several international research journals and also an expert member of the World Association for Sustainable Development, UK.. He is the Editor-in-Chief of the International Journal of Construction Project Management published by Nova Science Publishers Inc., USA.

Dr. Arain worked as Chair, Construction Project Management with Southern Alberta Institute of Technology (SAIT), Calgary, Alberta. He served as the Associate Dean of the School of Sustainable Building and Environmental Management at NAIT, Edmonton, Alberta. He also assisted Saskatchewan Polytechnic, Regina, SK providing educational, administrative and strategic leadership for a new baccalaureate degree program in construction management. Dr. Arain recently worked as the Senior Principal/Senior Dean, Niagara College (NC) Campuses in KSA. As the Senior Principal/Senior Dean, provided academic quality, administrative and strategic leadership to five campuses and business development portfolio.

Dr. Arain is currently the Vice President, Academic at the Northern Lakes College (NLC), Alberta, Canada. He can be reached at faisal.arain@gmail.com.

**Umberto Lucia**
*Politecnico di Torino, Italy*

# Thermoeconomics: a holistic approach to technical development

**Introduction:** The present days represent a crossroad in the history of humanity, and of the whole Earth. Complex dynamics both of growing the poverty distribution, and of increasing of ecological environmental and socio-economic degradation, are generating a difficult socio-economic system of despair from which it is very difficult to escape. Engineering and technological improvements can represent new possibilities for the renewal of the world, but a new indicator for the decision makers is required

**Objective:** Sustainable consumption of resources, production and energy policies are the keys for a sustainable development. Moreover, a growing request in bio-based industrial raw materials requires a reorganization of the chains of the energy and industrial sectors. This is based on new technological choices, with the need of sustainable measurements of their impacts on the environment, society and economy. In this context, social and economic requirements must be taken into account, too. Sustainable policies require new indicators, able to link economics, technologies and social well-being, together. Here, an irreversible thermodynamic approach is developed in order to introduce the Thermodynamics Human Development Index, an indicator based on the thermodynamic optimisation approach, and linked to socio-economic and ecological evaluation.

**Materials and Methods:** Human Development Index is an indicator of the developing level of a country, related to education, health, salary conditions, defined as HDI=(LEI·EI·II)1/3 where LEI=(LE-20)/(65) is the Life Expectancy Index, with LE Life expectancy at birth, EI= (MYSI+EYSI)/2 is the Education Index, with MYSI the Mean Years of Schooling Index and EYSI=ESI/18 Expected Years of Schooling Index, and II=ln (GNipc/100)/ln(750) the Normalised Income Index, where GNIpc is the gross national income per capita. But, HDI doesn't take into account the technological and ecological level. So, we introduce a new indicator, based on the Gouy Stodola theorem, useful in engineering optimisation, the Thermodynamic Human Development Index $THDI=\sqrt[3]{\frac{LEI \cdot EI}{I_T}}$ with $I_T = T_0\, m_{CO2}\, sg/(W \cdot GNIpc)$, with $T_0$ environmental temperature, $m_{CO2}$ carbon dioxide mass emission, sg specific entropy generation, and W useful work produced

**Results & Conclusions:** The result, THDI, improves the usual HDI, by taking into account also the technical and ecological level by using the $CO_2$ emissions and the sg quantities, related to the irreversibility of a process

**Giulia Grisolia**
*Politecnico di Torino, Italy*

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with $I_T = T_0\ mCO_2\ s_g/(W \cdot GNI_{pc})$, with T0 environmental temperature, $m_{CO2}$ carbon dioxide mass emission, sg specific entropy generation, and W useful work produced.

**Results & Conclusions:** The result, THDI, improves the usual HDI, by taking into account also the technical and ecological level by using the $CO_2$ emissions and the sg quantities, related to the irreversibility of a process.

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# Day-2

**J.C. Umavathi**
*Gulbarga University, India*

# Computation of steady dissipative thermal convection boundary layer flow of couple stress electroconductive polymer from an exponentially stretching sheet with hydrodynamic wall slip, Hall current and Ohmic heating

Magnetic polymer processing involves multiple physical phenomena and requires simultaneous consideration of rheological, hydromagnetic and thermal characteristics. Inspired by new developments in functional magnetic coating dynamics, the present article investigates the viscous magnetohydrodynamic non-Newtonian boundary layer flow of an incompressible, electrically conducting, couple stress, electroconductive polymer from an exponentially stretching sheet. Owing to slippery motion at the substrate, a slip velocity is included. The resulting reduced nonlinear boundary value problem is solved numerically by adopting shooting technique and bvp4c algorithm available in MATLAB software. Validation with the Adams-Moulton 2-step predictor corrector algorithm is included. Increasing Hall parameter strongly accelerates the secondary flow but only weakly accelerates the primary flow. Increasing magnetic interaction number decelerates the primary flow although back flow is never induced; secondary flow is however very significantly decelerated with greater magnetic interaction number i. e. stronger transverse magnetic field, and significant backflow is mobilized in the boundary layer regime. Elevation in mixed convection parameter ( ) notably accelerates and stabilizes the secondary flow and also generates significant primary flow acceleration. Higher values of Hall parameter initially accelerate the primary flow near the substrate (wall) whereas deeper into the boundary layer transverse to the wall they induce a deceleration into the free stream. Secondary flow is however consistently decelerated throughout the boundary layer with stronger Hall parameters. With increasing magnetic interaction magnetic number (M) there is also a substantial elevation in Ohmic heating effect and an associated increase in temperature and thermal boundary layer thickness. Couple stress effects generally accelerate both the primary and secondary flow.

**Biography:**

J.C. Umavathi completed her Post Doctral from the Department of Engineering, University of Sannio, Piazza Roma 21, 82100 Benevento, Italy. She is working as Professor in the Department of mathematics, Gulbarga University since 1993. She has published more than 215 research articles in reputed international journals. She is a recipient of Kalpana Chawla Young Scientist award, Sir J.C. Bose award and Erasmus Mundus Fellowship.

**Dr. Prajna Kunche**
*Indira Gandhi Center For Atomic Research, India*

## Recent Advances in Acoustic Emission Signal Processing

Acoustic emission (AE) is a stimulating research area to detect flaws, failures, and fractures in structures or materials. AE is related to the transient elastic waves due to the energy released from the structures/materials. It is one of the widely used and renowned non-destructive techniques for industrial inspections. It has several advantages: high sensitivity, low cost, early detection of cracks, and real-time monitoring. AE is based on the sound waves associated with the fracture in materials when they undergo some stress or loads onto it. Structural health monitoring, Source locations and Material mechanical performance are the predominant applications. The specific goals of AE signal processing are signal enhancement, source location and source characterization. In this talk, the latest research and applications of AE signal processing will be discussed, emphasising detecting and processing AE signals that play a vital role in developing AE instruments. The various signal processing domains applied for AE signal analysis and Adaptive Noise Control and Self Adaptive Noise Cancellations schemes based on Fractional Fourier Transform for AE signal enhancement will be discussed. A novel method based on Harmonic regeneration noise reduction for AE signal enhancement will be presented. The advanced machine learning techniques developed for AE signal processing and the applications of metaheuristics for AE signal processing will be discussed in detail.

**Biography:**

Dr. Prajna Kunche received her M. Tech. in Radars and Microwave Engineering and Ph.D. in Electronics and Communication Engineering from Andhra University, Visakhapatnam, India in 2009 and 2016 respectively. She has completed her B. Tech. in Electronics and Communications Engineering from Pragati engineering college, JNTU Hyderabad. She worked as an assistant professor (ad-hoc) in National Institute of Technology, Andhra Pradesh in 2016. She was a postdoctoral researcher in Non-destructive Evaluation division, Indira Gandhi centre for atomic research during 2017- 2020. She also has four years of teaching experience. She authored two books in Electrical and computer engineering book series and speech technology book series of Springer Nature. Currently, she is the Technical reviewer for few reputed scientific international journals and Editorial board member for three international journals. She has published one book chapter and 9 journal papers. Her research interests include Signal processing, Speech processing, Acoustic emission technology, Machine learning and Artificial intelligence.

**Dariusz Jacek Jakóbczak**
*Koszalin University of Technology, Poland*

# Reconstruction of Multidimensional Data on Intelligent Technology and Artificial Intelligence

Artificial Intelligence is applied for prediction and calculations of unknown values of data or coordinates. Decision makers, academicians, researchers, advanced-level students, technology developers, and government officials will find this text useful in furthering their research exposure to pertinent topics in AI, computer science, numerical analysis or operations research and assisting in furthering their own research efforts in these fields. Proposed method, called Two-Points Smooth Interpolation (TPSI), is the method of 2D curve interpolation and extrapolation using the set of key points (knots or nodes). Nodes can be treated as characteristic points of data for modeling and analyzing. The model of data can be built by choice of probability distribution function and nodes combination. TPSI modeling via nodes combination and parameter $\gamma$ as probability distribution function enables value anticipation in AI, risk analysis and decision making. Two-dimensional curve is extrapolated and interpolated via nodes combination and different functions as continuous probability distribution functions: polynomial, sine, cosine, tangent, cotangent, logarithm, exponent, arc sin, arc cos, arc tan, arc cot or power function.

**Biography:**

Dariusz Jacek Jakóbczak was born in Koszalin, Poland, on December 30, 1965. He graduated in mathematics (numerical methods and programming) from the University of Gdansk, Poland in 1990. He received the Ph.D. degree in 2007 in computer science from the Polish – Japanese Institute of Information Technology, Warsaw, Poland.

From 1991 to 1994 he was a civilian programmer in the High Military School in Koszalin. He was a teacher of mathematics and computer science in the Private Economic School in Koszalin from 1995 to 1999. Since March 1998 he has worked in the Department of Electronics and Computer Science, Koszalin University of Technology, Poland and since October 2007 he has been an Assistant Professor in the Chair of Computer Science and Management in this department. His research interests connect mathematics with computer science and include computer vision, artificial intelligence, shape representation, curve interpolation, contour reconstruction and geometric modeling, numerical methods, probabilistic methods, game theory, operational research and discrete mathematics.

**Yahia Chergui**
University M'Hamad Bougara of Boumerdes, Algeria

# Evolution in Time of Total Energy of ZnO Rocksalt Structure and Phase Transition a Molecular Dynamics Computational

The evolution in time of total energy of ZnO rocksalt type and Molecular Dynamics technique are investigated to analyse the phase transition; the calculations ran on RAVEN Supercomputer in Cardiff University(UK) using DL_POLY_4 software. In this work the interatomic interactions are modelled by Buckingham-Coulomb Potentia for short and long-range, the range of pressure is 0-200GPa and for temperature is 300-3000K. Our system is formed from 5832 atoms (2916 of Zinc and 2916 of Oxygen); We will analyze the effect of pressure and temperature on total energy in order to extract the equilibrium time to confirm the phase transition of ZnO rocksalt, our results are in agreement with available data. These results are very important in Nanotechnology and Technology.

**Donatella Delle Cave**
*Institute of Genetics and Biophysics "Adriano Buzzati Traverso", Italy*

## Lack Of L1CAM Drives Tumorigenicity, Stemness And Tumor Fibrosis In Pancreatic Ductal Adenocarcinoma

Pancreatic ductal adenocarcinoma (PDAC) is a leading cause of cancer-related mortality, characterized by extensive fibrosis causing chemoresistance and tumor progression. L1 cell adhesion molecule (L1CAM, L1) expression is generally associated with poor prognosis in different human tumors, while its role in PDAC remains debated. This study aims to explore the contribution of L1 in PDAC progression.
We performed tissue microarray analysis of L1 in PDAC patients and L1 cell sorting, silencing and overexpression in several PDXs. RNA sequencing was performed to characterize gene expression based on different L1 levels.
We discovered a new role of L1 as a tumor suppressor gene in pancreatic cancer. We found that L1 is downregulated in the majority of PDAC tumors, marks the highly tumorigenic subpopulation of cancer stem cells and increases chemoresistance and tumor invasiveness by inducing an augmented expression of collagen and metalloproteinases (MMPs), as demonstrated by RNA sequencing and confirmed by in vivo experiments. Conversely, overexpression of L1 counteracts stemness and thereby sensitize tumors for chemotherapy. We demonstrate that the TGF-β1 secreted by PSCs cells, the most abundant component of PDAC stroma, negatively regulates L1 expression, leading to increased stemness and tumorigenicity. Interestingly, we found that the L1low cells stimulates the collagen production by PSCs, while this effect is significantly attenuated by the overexpression of L1 in tumors. Altogether these data demonstrate an intrigued cross-talk between PSC and PDAC cells, in which the PSCs represent a supportive niche for PDAC cells promoting their aggressiveness through the downregulation of L1 mediated by TGF-β1. Furthermore, the tumor cells themselves can influence the mechanical properties of ECM and this effect is mediated by L1 downregulation. The restoration of L1 expression could prevents the malignant behavior of the tumor cells, thus leading to a less aggressive phenotype.

**Biography:**

Donatella Delle Cave has completed her PhD at the age of 28 years from Università degli Studi della Campania "Luigi Vanvitelli" in Naples (Italy). Currently, she is a Post Doc researcher at the National Research Council (CNR) of Italy, and she is working at the Institute of Genetics and Biophysics "A. Buzzati Traverso" (IGB-ABT) in Naples (Italy). Her research is focused on the study of the tumor-stroma crosstalk in pancreatic cancer and specifically she aims to identify the tumor-driving genes expressed by the cancer stem cells and to analyze how the stroma influences their expression.

Her work is founded by the AIRC foundation. She has published more than 10 papers in peer-reviewed journal and has participated in important international congresses.

**Ambresh P. Ambalgi**
*Mangalore University, India*

## Trends in Electronic Communication

The world is witnessing many disruptive electronic communication applications, such as 5G, IoT, cloud computing, and so on. The democratization of the tools both hardware and software is opening up newer opportunities. This talk chronicles the trends of electronic communication. The tools that enable such state of the art technology such as MIMO, OFDM, 5G. cognitive radio, and WiFi would be discussed.

**Hasan Koten**
*Istanbul Medeniyet University, Turkey*

## Fuel Blends in Internal Combustion Engines

Diesel engines using compression ignition are increasingly prohibited in cities because of increased environmental concerns. This could lead to greater use of low-powered spark-ignition engines in hybrid electrical cars. Using alternative fuels is important for spark-ignition engines. In the study reported in this paper, performance and in-cylinder pressure data were collected from petrol- and methane-fuelled spark-ignition engines. A theoretical engine model was then verified using experimental data. The theoretical results for methane and petrol were finally compared for different engine speeds. The theoretical model used a combustion model and chemical kinetics model to compare the effects of methane and petrol on engine performance and emissions at different engine speeds. Thanks to the high knock resistance of methane, the most suitable ignition advance value was decided for the methane-fuelled simulation by considering the maximum thermal efficiency to limit assumed reductions in indicated thermal efficiency and indicated mean effective pressure compared to previous studies. A slight reduction in nitrous oxides and carbon monoxide emissions was observed when using methane at full load.
This presentation will lead to further projects in different research.

**Biography:**

Assoc. Prof. Hasan KOTEN graduated from Mechanical Engineering Department with honor of degree in 2007. At the same time, he received a BSc degree in Electrical and Electronics Engineering Department as a double major. Hasan KOTEN worked in the first full geometry engine design project for The Scientific and Technological Research Council of Turkey (TUBITAK). During his Ph.D., he worked as a visiting scholar at the Ohio State University Center for Automotive Research (CAR). Hasan KÖTEN also worked as a consultant for TUBITAK Domestic Electric Vehicle Design project in 2017. He attended to CEDP group at Brunel University as a post-doctorate researcher in 2018. Assoc. Prof. Hasan KÖTEN is Head of Mechanical Engineering of Istanbul Medeniyet University, currently. He leaded number of projects, MSc and PhD thesis in this combustion field. He attended and presented more than 100 conference proceedings and published about 30 articles indexed in SCI and SCI-e. He is awarded by TUBITAK 2238 programme with first degree over all national PhD thesis applicationsa.

**Ahmad K. Sleiti**
*Qatar University, Qatar*

## Future Energy Industry; Key Challenges, Digitalization and Super-critical CO2 Power Systems

The energy industry is facing several key challenges including the need for rapid transformation of power systems and the negative impact of power plant cycling. These challenges can be mitigated by improving the flexible power plant operation via digitalization and connected plant technologies. Currently, the digital transformation of power plants is gaining momentum as a key enabling technology for R&D with future applications in cyber-physical systems for reducing design time and cybersecurity system and validation. Herein, we present an overview of key research and development towards digitalization of energy production systems and we provide research gaps, guidelines, and suggested future directions. The second part of the present work addresses major challenges related to the integration of solar renewables with other energy systems; namely the solar intermittency and the complexity of power loading control. This is done by integrating concentrated solar power (CSP) systems with direct oxy-combustion (DOC) supercritical carbon dioxide (sCO2) power systems. Innovative integrated power cycle configurations are introduced that reduce the fuel and the parasitic power consumptions and reduce the capital cost associated with the conventional systems by eliminating the need for thermal storage. Thorough energetic, exergetic, exergoeconomic, levelized cost of electricity (LCOE), and muti-objective optimization analyses are conducted for each configuration over practical ranges of operating conditions. Results show that the LCOE of the integrated systems is 50% lower than conventional CSP systems.

**Biography:**

Dr. Sleiti is a recognized energy leader with 29 years of experience in industry and academia in the fields of conventional and renewable energy systems, sustainability, turbomachinery, fuel cell systems, thermal management, and refrigeration. He has published more than 124 peer- reviewed journal and conference papers (including patents) and has delivered more than 100 presentations and technical reports. Dr. Sleiti is a professor of mechanical engineering at Qatar University. His a licensed professional engineer (PE) in Florida, USA, Certified Energy Manager and Auditor. He is a member of several professional organizations including ASME, ASHRAE, AIAA, ASEE and others.

**Samir Ladaci**
*National Polytechnic School of Constantine, Algeria*

## Recent Advances in Fractional adaptive Control

Fractional adaptive control is a very recent control research field, gathering more and more interest these last years because of the improvement obtained of the control system performance when compared to the classical adaptive control schemes. This paper presents some new ideas that I have proposed with my PhD students along the last ten years. Since more than a decade, research activities in control theory are based on developing new analysis and design methods for fractional order controllers as an extension of classical control theory. Fractional PIλDμ (Podlubny 1999), CRONE controller (Oustaloup et al. 1995) and fractional adaptive control (Ladaci and Charef 2006) are examples of popular Fractional order controllers.
Many authors have attempted to improve the adaptive control system behavior by using fractional order derivatives and systems, since the first papers appearance in 2002 (Vinagre et al. 2002) (Ladaci et al. 2002). The proposed schemes cover fractional model reference adaptive control, fractional order self-tuning regulators, robust fractional adaptive control, fractional adaptive sliding mode control, fractional adaptive high gain control, fractional adaptive internal model control and adaptive control of fractional order systems. The discussions of the proposed techniques for the analysis of the fractional adaptive control systems concern particularly the stability proofs, that greatly evolved since the results on Lyapunov stability developed by (Aguila-Camacho and Durate-Mermoud 2014).
In this presentation, I will focus on three recent schemes of fractional adaptive control that I have published recently with some application examples:

1. Fractional MRAC control for linear systems;
2. Fractional Model Predictive control;
3. Fractional order tube- MRAC adaptive control.
4. I will conclude with some future works and outlook in the field of fractional adaptive control.

**Biography:**

Samir Ladaci received the State Engineer degree in Automatics in 1995 from the National Polytechnic School of Algiers and the Magister degree in Industrial Automation from Annaba University, Algeria in 1999. He obtained his Science Doctorate and Habilitation degrees from the department of Electronics, Mentouri University of Constantine, Algeria, in 2007 and 2009 respectively. His was a visiting researcher at IRCCyN, CNRS Nantes, France from 2006 to 2008, and has many collaboration projects with different research teams in France, Tunisia and Italy. From 2001 to 2013 he worked at the Department of Electrical Engineering at Skikda University, Algeria, as an Associate Professor. And since 2013 he joined the National Polytechnic School of Constantine, where he is a full Professor. He has published more than 150 papers in journals and International conferences, many book chapters and co-edited a book and supervises many PhD theses (9 already defended with success).

His current research interests include Fractional order Systems and Control, Fractional Adaptive Control, Fractional nonlinear and chaotic systems, Robust Control.

**Eduard Babulak**
*National Science Foundation, USA*

## Third Millennium Life Saving Smart Cyberspace driven by AI & Robotics

Given the current dynamic developments in the field of AI & Robotics, Big Data, Massive Data Storage and Ubiquitous access to highspeed Internet 24/7 for anyone worldwide, the term Smart Cyberspace is becoming well accepted reality. In light of currently ongoing developments of Covid- 19 crisis, having effective real-time application of Artificial Intelligence & Robotics with the Big Data remotely control via Internet is essential. The utilization of John Hopkins Corona Map [1], in conjunction with collecting real-time data from the Electronic Health Record (EHR) in the nation and worldwide, as well as collections of antibodies contributes well to community worldwide aspirations to safe human lives and to restart the economies worldwide. These are most dramatic times for mankind worldwide, and yet despite of its most negative impact it does also inspire dynamic innovation, research and developments in the world of health, business, government, industry, plus., while promoting seamless creation of multidisciplinary teams of experts in the nation and worldwide. The authors will discuss the current and future dynamic trends in research, innovation and developments of cutting-edge technologies, AI. Robotics, and smart cyber systems that will contribute effectively to people saving lives, and decision makers in the nation and worldwide.

**Biography:**

Professor Dr. Eduard Babulak is accomplished international scholar, researcher, consultant, educator, professional engineer and polyglot, with more than thirty years of experience. He served as successfully published and his research was cited by scholars all over the world. He serves as Chair of the IEEE Vancouver Ethics, Professional and Conference Committee. He was Invited Speaker at the University of Cambridge, MIT, Purdue Speaker Photo University, Yokohama National University and University of Electro Communications in Tokyo, Japan, Shanghai Jiao Tong University, Sungkyunkwan University in Korea, Penn State in USA, Czech Technical University in Prague, University at West Indies, Graz University of Technology, Austria, and other prestigious academic institutions worldwide. His academic and engineering work was recognized internationally by the Engineering Council in UK, the European Federation of Engineers and credited by the Ontario Society of Professional Engineers and APEG in British Columbia in Canada. He was awarded higher

postdoctoral degree DOCENT – Doctor of Science (D.Sc.) in the Czech Republic, Ph.D., M.Sc., and High National Certificate (HNC) diplomas in the United Kingdom, as well as, the M.Sc., and B.Sc. diplomas in Electrical Engineering Slovakia. He serves as the Editor-in-Chief, Associate Editor-in-Chief, Co- Editor, and Guest-Editor. He speaks 16 languages and his biography was cited in the Cambridge Blue Book, Cambridge Index of Biographies, Stanford Who's Who, and number of issues of Who's Who in the World and America.

**Next Event:**

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***August 27-29, 2021***

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