ESDA 2010

ASME, 10th Biennial Conference on Engineering Systems Design and Analysis

July 12 – 14, 2010

Yeditepe University

www.asmeconferences.org/esda2010

FINAL PROGRAM

YEDİTEPE UNIVERSITY

ASME
SETTING THE STANDARD

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WELCOME

Dear Colleagues,

On behalf of the organizing committee I would like to welcome you to Istanbul for the **ASME 2010 10th Biennial Conference on Engineering Systems Design and Analysis (ESDA2010)**. This three day conference of ASME is being organized by Yeditepe University and the ASME Turkey Section. The purpose of this letter is to give a brief overview of the current standing of the conference from an organizational viewpoint.

The conference organization started with the launch of conference website at http://www.asmeconferences.org/esda2010. An exhaustive effort aimed at announcing and publicizing the conference paid off well, indicated by the large interest received from the related academic and industrial circles. A record number of abstracts (topping 1200) were received, almost half of which (568 to be exact) being accepted as full papers. The accepted papers were categorized into a total of 15 tracks which are: Advanced Energy Systems (42), Advanced Materials and Tribology (56), Applied Mechanics (56), Automotive Engineering and Technologies (40), Bioengineering and Biomedical Technology (19), Computational Mechanics (41), Design Engineering (43), Dynamic Systems and Control (63), Fluids Engineering (30), Heat Transfer (49), Manufacturing Systems (32), Mechanisms and Robotics (34), Mechatronics (14), Micro and Nanotechnology (38), and Science, Engineering & Education (11), where the brackets indicate the number of papers for the respective track. We are expecting that authors of a vast majority of these papers will show up and present their work during the event.

There are five keynote lectures highlighting the conference. The speakers and their respective speech titles are, Dr. C. D. Mote, Jr. (President, University of Maryland): Nurturing Innovation; Dr. Nam Pyo Suh (President, KAIST): Innovative Engineering Systems; Dr. Nihat Berker (President, Sabanci University): Undergraduate Education with Focus on Research; Dr. Hugh Spikes (Professor, Imperial College): Recent Advances in Liquid Lubrication Research; and Dr. Adnan Akay (Vice President, Bilkent University): Dissipation and Irreversible Energy Transfer in Dynamics Systems.

In tandem with the conference there will be professional and student activities in conjunction with ASME. Prior to the conference, an ASME short course program is scheduled to take place between 7-11 July, 2010. This will be the first time such an event has ever been organized in Turkey. In addition, following the conference, the ASME District H Student Professional Development Conference (SPDC) will take place between 14-16 July, 2010. Highlighting this event, a Student Design Contest (SDC) will be held in the conference venue, on July 14, 2010.

A large selection of pre- and post-conference tours is being offered by Interium, the official travel agent for the conference. Social program of the conference includes a welcome reception following a “live documentary” presentation entitled “Istanbul: City of Cities”; a gala dinner at the social facilities of Istanbul Chamber of Commerce located in Cemile Sultan Woods; and a farewell boat cruise aboard a Bosphorus cruise ship.

I would like to take this opportunity to thank the keynote speakers for their participation, authors for submitting their valuable work to the conference, reviewers for taking time and reviewing papers, track chairs for leading their technical tracks, and the conference technical chair for his tremendous effort in organizing the technical content. In addition, to members of the organizing committee who have worked very hard to make **ESDA 2010** a highly successful conference both technically and socially: your tremendous efforts are highly appreciated.

I wish all participants a pleasant week during the conference and for our international guests, I wish you a favorable stay in Istanbul and Turkey. I hope that you spend a memorable time in the next few days and that this conference will produce fruitful results for all of you.

Thank you again!

Prof. Dr. Nilufer Egrican
General Conference Chair
Vice President
Yeditepe University

ORGANIZING COMMITTEE

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TRACK CHAIRS

Track 1
Advanced Energy Systems

Track Chair:
Verda Vittorio, *Politecnico di Torino - DENER*
Email: vittorio.verda@polito.it

Track 2
Advanced Materials and Tribology

Track Chair:
Ali Erdemir, *Argonne National Laboratory*
Email: erdemir@anl.gov

Track Co-Chair:
Mustafa Urgen, *Istanbul Technical University*
Email: urgen@itu.edu.tr

Track 3
Applied Mechanics

Track Chair:
Adnan Akay, *Bilkent University*
Email: akay@cmu.edu

Track Co-Chair:
Sinan Filiz, *Bilkent University*
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Track Co-Chair:
Melih Cakmakci, *Bilkent University*
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Track 4
Automotive Engineering and Technologies

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Orhan Alankus, *Koc Holding*
Email: orhana@koc.com.tr

Track Co-Chair:
Ferruh Ozturk, *Uludag University*
Email: ferruh@uludag.edu.tr

Track 5
Bioengineering and Biomedical Technology

Track Chair: Eitan Kimmel, *Technion*
Email: eitan@bm.technion.ac.il

Track 6
Computational Mechanics

Track Chair:
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Email: v.silberschmidt@lboro.ac.uk

Track Co-Chair:
W. Malalalsekera, *Wolfson School of Mech. and Manuf. Engineering*
Email: w.malalasekera@lboro.ac.uk

Track 7 Design Engineering

Track Chair:
Abdulkadir Erden, *Atilim University*
Email: aerden@atilim.edu.tr

Track 8
Dynamic Systems and Control

Track Chair:
Yoram Halevi, *Technion*
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Track 9
Fluids Engineering

Track Chair:
Volkan Otugen, *Mechanical Engineering Department*
Email: otugen@engr.smu.edu

Track Co-Chair:
Michael Plesniak, *The George Washington University*
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Track 10
Heat Transfer

Track Chair:
Hojin Ahn, *Yeditepe University*
Email: erdeman@yeditepe.edu.tr

Track 11 Manufacturing Systems

Track Chair:
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Track 12 Mechanisms and Robotics

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Email: jian.dai@kcl.ac.uk

Track Co-Chair:
Chintien Huang

Track 13 Mechatronics

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Track 14 Micro and Nanotechnology

Track Chair:
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Track 16 Science, Engineering & Education

Track Chair:
Nihat Berker, *Sabanci University*
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KEYNOTE LECTURERS

Monday, 12 July 2010, 09:45

Dr. Clayton Daniel Mote, Jr.

President and Glenn L. Martin Institute, Professor of Engineering
University of Maryland
College Park, MD, USA

ABSTRACT: NURTURING INNOVATION

Innovation is the use of a new idea to introduce a better way of doing something. Innovation refers to a change in thinking, products, ideas, processes, or organizations that leads to a better implementation. Successful implementation is fundamental to innovation. The scales of innovation implementation range from tiny to enormous depending on what is being done.

Innovation occupies our attention today because the solution of almost every major problem is thought to depend on innovation. How will we raise the quality of life for every citizen? The answer is through innovation. How will we increase the standard of living? How will we sustain a competitive national economy? How will we increase the safety of foods, increase productivity, develop alternative energy, combat global warming, ensure national security, fight poverty, reduce health care costs, fight pandemics, provide affordable education, reverse environmental degradation, and so on? The answer is always through innovation.

While much is known about particular innovators and innovative companies, less attention has been paid to: the culture that nurtures innovation and how that culture can be developed so that innovation can address the global problems relying on it. Two great challenges confronting innovation for the world's problems are: (1) How can the pace of innovation be accelerated to keep up with the rate of discoveries in science and technology? (2) How can innovation take on the most complex global challenges – problems like clean water, national security, terrorism, food security, energy, environmental degradation, and climate change?

Today we will discuss nurturing innovation in a connected world that is experiencing accelerating scientific and technological changes. We will review the history that has led to the state of innovation today. The global connectivity among individuals, organizations, and governments has expanded both the pace of innovative development and the scale of problems requiring innovative solutions. We will view innovation in societal layers that will help us see the changes that will be needed for innovation to ultimately fulfill its promise to effectively address our great global challenges.

BIOGRAPHY

C. D. (Dan) Mote, Jr. is President of the University of Maryland and Glenn L. Martin Institute Professor of Engineering. Under his leadership, academic and research programs at the University have flourished. In 2009, the University was ranked 18th among public research universities, up from 30th in 1998. Dr. Mote is a leader in the national dialogue on higher education. He has testified on major educational issues before Congress, representing the University and higher education associations on the problem of visa barriers for international students and scholars and on deemed export control issues. He has served and currently serves on several National Academy of Sciences (NAS) committees that work to identify challenges to United States leadership in key areas of science and technology, including the committee that wrote the Rising Above the Gathering Storm report. Dr. Mote is currently chair of the National Research Council's Committee on Global Science and Technology Strategies and Their Effect on U.S. National Security, and co-chair of the NAS Government-University-Industry-Research Roundtable. He has served as vice chair of the Department of Defense Basic Research Committee and was a member of the Academy of Arts and Sciences ARISE panel that produced Advancing Research in Science and Engineering: Investing in Early-Career Scientists and High-Risk, High-Reward Research. In 2004 he was appointed a founding member of the National Security Higher Education Advisory Board. Dr. Mote is a member of the Council and treasurer of National Academy of Engineering (NAE).

Dr. Mote has spurred the University to develop its high-tech economy, especially in information, bioscience and biotechnology, energy, language, security and nanotechnology. He has greatly expanded the University's partnerships with federal laboratories and inaugurated the first research park sponsored by the People's Republic of China outside the Mainland. China also founded the first Confucius Institute, an international Chinese language, literature and culture center, at the University of Maryland. Under his leadership, the University founded a research park on 128 acres adjacent to the campus with 3 million square feet of development potential, making it the largest park in Maryland and Greater Washington. The NOAA National Center for Weather and Climate Prediction will be located there.

Prior to assuming the Presidency at Maryland, Dr. Mote was a member of the University of California, Berkeley faculty for 31 years. From 1991 to 1998, he was Vice Chancellor at Berkeley, held an endowed chair in Mechanical Systems and was President of the UC Berkeley Foundation. He led a comprehensive capital campaign for Berkeley that raised $1.4 billion. He earlier served as chair of Berkeley's Department of Mechanical Engineering and led the department to its number one ranking in the National Research Council review of graduate program effectiveness.

Dr. Mote is internationally recognized for his research on the dynamics of gyroscopic systems and the biomechanics of snow skiing, and has produced more than 300 publications. He holds patents in the U.S., Norway, Finland and Sweden, and has mentored 58 Ph.D. students. Dr. Mote has received numerous awards and honors, including the Humboldt Prize awarded by the Federal Republic of Germany. He is a recipient of the Berkeley Citation, an award from the University of California-Berkeley similar to the honorary doctorate, and was named Distinguished Engineering Alumnus. He has received two honorary doctorates. Dr. Mote is a fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science, the Acoustical Society of America, and the International Academy of Wood Science, and he holds Honorary Membership in the American Society of Mechanical Engineers (ASME). He received the 2005 J. P. Den Hartog award from the ASME International Technical Committee on Vibration and Sound to honor his lifelong contribution to the teaching and/or practice of vibration engineering. In 2005 he received the Founders Award from the National Academy of Engineering in recognition of his comprehensive body of work on the dynamics of moving flexible structures and his leadership in academia. He earned the B.S., M.S. and Ph.D. in mechanical engineering from the University of California, Berkeley.

Monday, 12 July 2010, 13:30

Dr. Nam Pyo Suh

President
Korea Advanced Institute of Science and Technology (KAIST)
Daejeon, Korea

ABSTRACT: INNOVATIVE ENGINEERING SYSTEMS DESIGNED AND DEVELOPED AT KAIST - OLEV AND MH

Commencing in 2009, KAIST has designed and built two innovative engineering systems: On-Line Electric Vehicle (OLEV) and Mobile Harbor (MH). OLEV is an electric car or bus that draws its electric power from an underground electric power system without using any mechanical contact. The electric power transmitted wirelessly propels the vehicle and also recharges a small battery on board the vehicle. The battery is used to power the vehicle on roads without the underground cable and also when additional power is needed for acceleration. Large OLEV buses and cars draw about 60 kW and 20 kW of maximum power, respectively, from the underground cable. The efficiency of power transmission is over 74%. The EMF generated is well within the regulatory guidelines. The OLEV system was designed and manufactured, including the underground infrastructure, by professors and researchers at KAIST in collaboration with industrial firms, in a relatively short period of time. An OLEV bus is now deployed at the Grand Park of Seoul City. In the near future, KAIST will be installing bus lines in Seoul. In addition to OLEV, KAIST has also designed and installed mobile harbors (MH). MH is a harbor that goes out to large containerships that are moored in deep waters to load and unload containers. The Mobile Harbor eliminates the need for large harbors that are expensive to construct and environmentally undesirable. MH can deliver the cargo to any small port nearest to the final destination. A 1:25 scale Mobile Harbor has been designed and built to demonstrate the key technologies of MH in simulated ocean environment. A systematic design procedure, including Axiomatic Design, was used in designing these complex engineering systems.

BIOGRAPHY

Suh was born in Korea on April 22, 1936, and immigrated to the U.S. in 1954 to join his father who was teaching at Harvard University. He completed his high school education at Browne & Nichols School before entering MIT as a freshman in 1955.

From 1965-1969, Suh served as a professor at the University of South Carolina. In 1970 he began his professional career at MIT--serving as director of the MIT-Industry Polymer Processing Program from 1973-1984; director of the Laboratory for Manufacturing and Productivity from 1977-1984; and Mechanical Engineering Department Head from 1991 to 2001. Although still keeping the title of Ralph E. Cross Professor of Mechanical Engineering at MIT, Suh is now President of KAIST.

During his tenure at MIT, Suh also worked for industry and the government. In October 1984, Professor Suh took a leave of absence from MIT to accept a Presidential Appointment by President Ronald Reagan to the National Science Foundation where he was in charge of engineering. During his tenure at NSF, he created a new direction for the Engineering Directorate and introduced a new organizational program designed “to ensure that the United States will occupy a leadership position in engineering well into the 21st century.”

Suh is on the board of several companies and founded TREXEL, Inc. He also served as the Assistant Director for Engineering at US National Science Foundation from 1984 to 1988 and has consulted for the UN, National Laboratories, World Bank and the Korean government (where developed Korea’s Five-Year Economic Plan in the 1980s).

Tuesday, 13 July 2010, 11:20

Dr. Adnan Akay

Vice President and Professor
Bilkent University
Ankara, Turkey

ABSTRACT: DISSIPATION AND IRREVERSIBLE ENERGY TRANSFER IN DYNAMIC SYSTEMS

Dissipation refers to conversion of mechanical energy to thermal energy during which the internal energy of the medium increases. In solids, the increase in the internal energy is equivalent to the increase in the kinetic energy of atoms oscillating about their equilibrium positions. In fluids, the increase in internal energy corresponds to the rise in the thermal velocity of the molecules that are in random motion. In both cases, dissipation is an irreversible process where ordered mechanical energy is converted to disordered thermal energy of the molecules. An exception occurs during Brownian motion where at the molecular level energy exchange takes place continuously between molecules in a fluid and a particle, displaying a localized reversible energy exchange between ordered and disordered states. The treatment of dissipation and energy exchange at the molecular level usually requires statistical methods and relies on the collective behavior of molecules in the medium that are too numerous for computational approaches. Inspired by the energy dissipation mechanisms in nature, this presentation demonstrates how nearly-irreversible energy transfer can be realized in linear conservative systems employing a much smaller degree of freedom than the molecular populations solids or fluids provide. Irreversibility in physical systems that have low dimensions normally develops as a result of nonlinearities. In conservative linear systems, energy exchange within a structure or among its modes takes place with some recurrence determined by the system configuration. As shown in this presentation, by suitable selection of system parameters, energy may be transported with near irreversibility, creating an apparent damping effect. The presentation describes mathematical approaches used to identify the system parameters that lead to irreversibility and extends the concept to continuous systems. The presentation concludes with a description of experiments, including an application to reduce vibrations in a satellite.

BIOGRAPHY

Adnan Akay joined Bilkent University on January 1, 2009 as the founding head of Mechanical Engineering Department and as its Vice President. He joined Bilkent from the U.S. National Science Foundation where he was the director of the Division of Civil, Mechanical and Manufacturing Innovation Division. Between 1992 and 2005 Dr. Akay was the head of the Mechanical Engineering Department at Carnegie Mellon University where he currently holds the title of Lord Professor of Engineering. Prior to joining Carnegie Mellon, he was on the faculty at Wayne State University, where he last held the DeVlieg Chair in Engineering, and prior to that he was with the National Institutes of Health. He has held visiting appointments at several universities and continues to collaborate with colleagues at the University of Rome “La Sapienza,” and Institut National des Sciences Appliquées (INSA) de Lyon in France. He also serves as an advisor to numerous companies and universities. Adnan Akay’s research area is in acoustics, vibrations and friction with applications ranging from submarines to aircraft and automotive brakes and most recently to haptics. He has published extensively and received numerous awards including the Per Brüel Gold Medal in Acoustics and Noise Control in 2005 from ASME. He is a Fellow of the American Society of Mechanical Engineers and the Acoustical Society of America.

Tuesday, 13 July 2010, 13:30

Dr. Hugh Spikes

Professor of Lubrication
Imperial College
London, UK

ABSTRACT: RECENT ADVANCES IN LIQUID LUBRICATION RESEARCH

Although gas and solid lubrication are becoming increasingly important, liquid and grease lubrication continue to be by far the most widely-used methods of lubricating rubbing contacts in engineering systems.

Historically, the mean focus of attention in liquid lubrication research was on extending machine durability by controlling wear, seizure and fatigue of rubbing contacts. However in the last decade, environmental concerns have become the main driver of research. Of paramount importance is now the need to lower friction in machine components and thus increase their efficiency. This is leading to a progressive reduction in the viscosities of lubricants used in machine components, as well as to extensive research on new lubricant components and new surface treatments and coatings able to deliver low friction.

Another trend arising from environmental concerns is replacement in many machine components of traditional steel by lightweight materials such as aluminium alloys and polymers. The lubrication requirements of such materials are necessitating much research, not least to understand properly how lubricants interact with steel so that we can see what changes are needed to lubricate other materials.

Other areas of lubrication research driven by qrowing concern for the environment include the need for engine lubricants that are compatible with exhaust after-treatment systems, problems of effectively lubricating wind turbine transmission, compatibility of lubricants with biofuels and the design of biodegradeable lubricants.

This presentation briefly outlines the widespread impact of environmental concerns on liquid lubrication research and then highlights a few specific examples how new research in liquid lubrication is supporting our quest for a stable and benign environment.

BIOGRAPHY

Hugh Spikes graduated in Natural Sciences from the University of Cambridge in 1968 and obtained his PhD for research in Tribology from Imperial College in 1972. He is currently Head of the Tribology Research Group and Professor of Lubrication in the Mechanical Engineering Department, Imperial College London. His research Group currently comprises five full time academic staff, eleven post doctoral researchers and twenty-six PhD students.

Professor Spikes is a Fellow of the Institution of Mechanical Engineers (IMechE) and also of the Society of Tribologists and Lubrication Engineers (STLE). He has been involved in research in tribology for over forty years and has received a number of recognitions for his research achievements including the ASME Mayo D Hersey Award and the STLE International Award. In 2004 he was awarded the Tribology Trust Tribology Gold Medal, the highest international honour in Tribology. Nine of his research publications have received best paper awards, from STLE, IMechE and ASME.

Professor Spikes' research interests span a wide range of liquid lubrication research, including hydrodynamic, elastohydrodynamic and boundary lubrication. A particular interest has been thin film lubrication and the influence of lubricant composition on the film-forming properties of lubricants and thus on friction and wear performance. Several of the experimental techniques developed during his research have become standard tools for tribology research in industry and academia.

Wednesday, 14 July 2010, 11:15

Dr. A. Nihat Berker

President
Sabanci University
Istanbul, Turkey

ABSTRACT: UNDERGRADUATE EDUCATION WITH FOCUS ON RESEARCH

The completion of an undergraduate program with very good grades at a top university, by itself, in our times does not amount to a successful university education. Current times require and enable students fresh out of high school, from day number one at their university, to engage in meaningful research and outreach projects, pioneering real-life problems in which even the proper positioning of the problem and method is often a major task and a good part of the solution. This approach, initiated in 1969 at MIT as UROP – Undergraduate Research Opportunities Program, is implemented by faculty proactively seeking the students. This approach, currently conducted in Turkey, will be illustrated by examples: (1) The research engagement of students from their first university year, resulting in top research performance as reflected in publications in leading journals and presentations at international conferences. (2) Intensive graded summer courses for undergraduates, attended by students from dozens of universities, in topics such as Phase Transitions, Renormalization-Group Theory, Condensed Matter Physics, Systems Bipology. (3) Intensive university-level graded summer courses for high school students, attended by students from close to a hundred high schools, in topics such as Augmented Mechanics, Special Relativity, Elementary Quantum Mechanics, Introduction to Antropology, Archeology, Economics, Political Science, Psychology, Sociology. (4) Real community-involvement projects practiced by university students in their first year and beyond. All of these efforts aim at all students being involved in the physical sciences and in the the social sciences and in community outreach activities.

BIOGRAPHY

A. Nihat Berker is the Rector of Sabanci University in Istanbul. His academic specialty is theoretical physics, with over 120 publications and 4200 scientific citations, and he was a faculty member at MIT in 1979-99. He teaches courses in physics (at all levels: undergraduate, graduate, intensive high school), chemistry, and humanities.

Pre-Reception Presentation

ISTANBUL: CITY OF CITIES (Monday, 12 July 2010, 19:00)

A vivid portrait of Byzantium, Constantinople and Istanbul, known in antiquity as the "City of Cities". The life and arts of Byzantine Emperors and Ottoman Sultans and of modern Turkey. This program, full of fascinating legends, historical episodes and poetry, features more than a hundred colour slides depicting the excitement, architectural splendor and artistic creativity of the "Queen City".

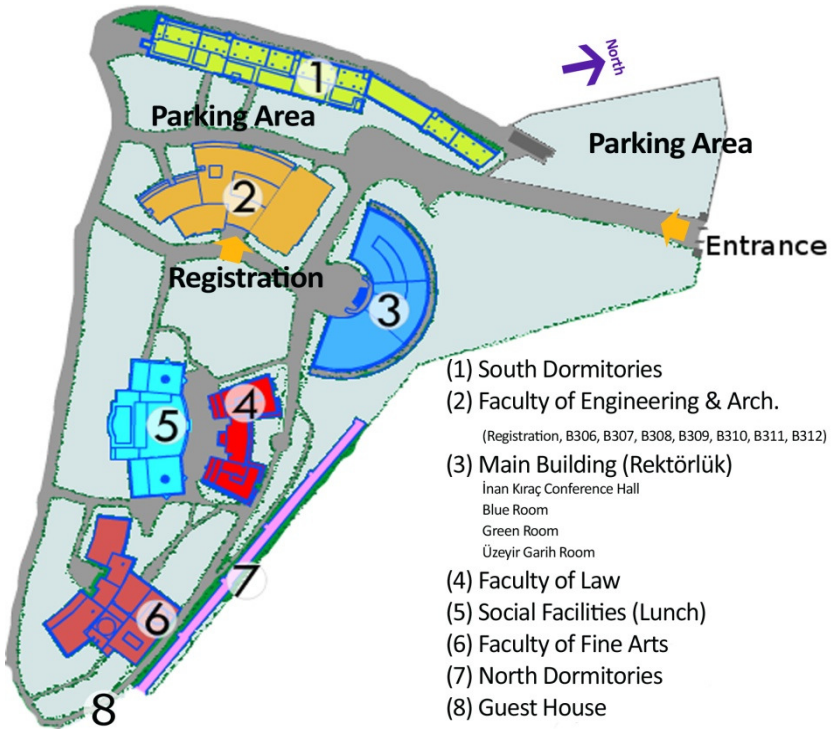
Presented by **Yıldız Kenter** and **Talat Halman,** Text by **Talat Halman**

Yildiz Kenter is Turkey's prominent stage actress. Born in Istanbul to Turkish and British parents, she graduated from the Ankara State Conservatory, achieved early renown at the State Theatre (Ankara), and worked at New York's American Theatre Wing, Neighborhood Playhouse and Actor's Studio on a Rockefeller Fellowship. In the early sixties she established Turkey's leading independent theatre, Kent Players, with her brother Müşfik Kenter and husband Şükran Güngör. She has appeared in leading roles in more than one hundred plays ranging from Shakespeare to Neil Simon, Chekhov to Ayckbourn, Brecht to Arthur Miller.
Prof. Kenter has also directed nearly one hundred plays. She has performed almost everywhere in Turkey. Abroad, she has acted in the US, France, Britain, Russia, Finland, Denmark, and other countries. In 1981 she was given the honourary title of "State Artist." Since 1959 she has been a professor of drama and currently serves as Chairperson of the Department of Dramatic Arts at the State Conservatory, Istanbul University. She has won innumerable awards and honours including Italy's "Adelaide Ristori" prize and the Turkish President's Culture and Arts Award and was named "One of the World's Hundred Most Successful Women" by Finland's International Women's Organization. In December 2004, Hacettepe University conferred an honorary doctorate on her.

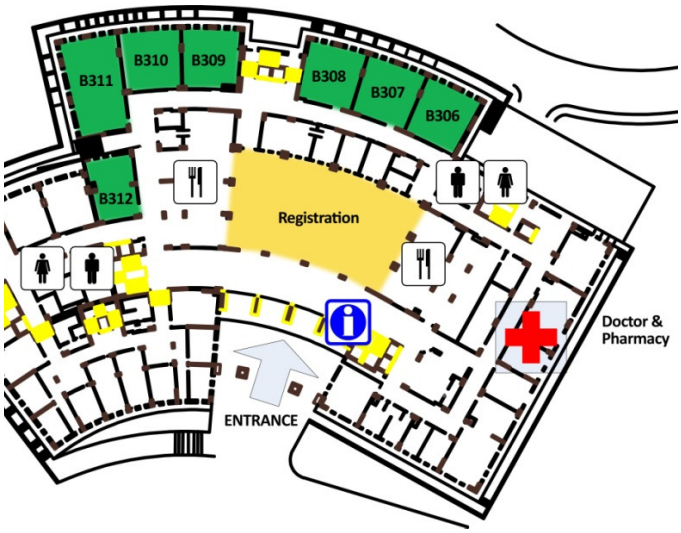
Talat Halman served as the first Minister of Culture of the Turkish Republic. Currently he is Professor and Chairman, Department of Turkish Literature and Dean of Humanities and Letters, Bilkent University. Formerly he was on the faculties of Columbia, Pennsylvania, and Princeton Universities for many years, and from 1986 to 1996, Professor and Chairman of the Department of Near Eastern Languages and Literatures at New York University. He served as Ambassador for Cultural Affairs and Turkey's Deputy Permanent Representative at the United Nations. He has published seventy books (including 12 collections of his own poetry in Turkish and English) and 3000 articles in Turkish and English. From 1991 to 1995, he served as an elected member of the UNESCO Executive Board in Paris. Currently he is President of the UNICEF Turkish National Committee, and chairman of the Board of Trustees of the Istanbul Foundation for Culture and Arts. He holds honorary doctorates from Boğaziçi and Ankara Universities. Honors and awards include Distinguished Service Awards of the Turkish Academy of Sciences and the Turkish Foreign Ministry, and "Knight Grand Cross, G.B.E., The Most Excellent Order of the British Empire", (counterpart of "Sir") conferred on him by Queen Elizabeth II.

FINAL PROGRAM

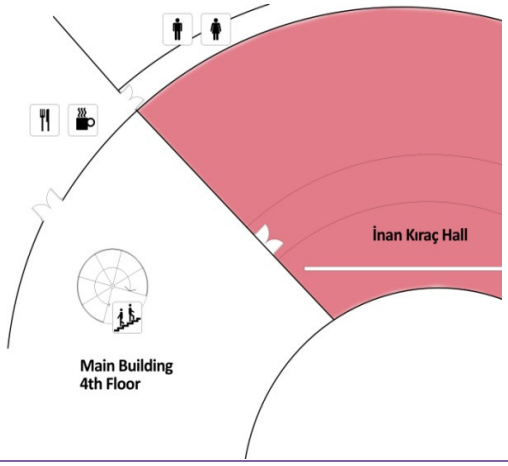
General Layout of the Campus, Meeting Rooms & Important Places

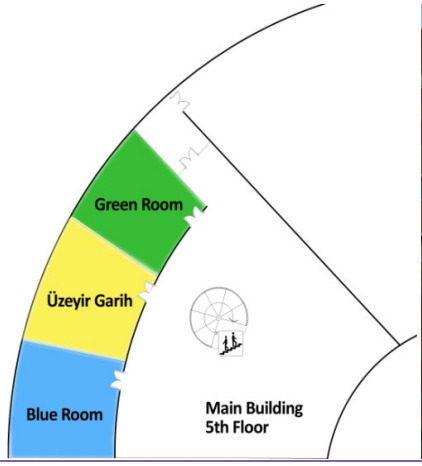


Building No 2, Faculty of Engineering & Architecture (Registration Desk & Rooms 306 – 312)



Building No 3, Main Building (İnan Kıraç Conference Hall, Blue Room, Üzeyir Garih, Green Room)





ESDA2010 CONFERENCE SCHEDULE, Monday, 12 July 2010

Time		Program				
8:00		**Registration**				
9:00-9:45		**Opening Session, Main Building (Rektörlük), Conference Hall: İnan Kıraç**				
		Keynote Lecture, Conference Hall: İnan Kıraç				
9:45-10:40		**Dan Mote, Jr.** President, University of Maryland, Glenn L. Martin Institute Professor of Engineering Lecture Title: **NURTURING INNOVATION** Chair: **Adnan Akay**, Vice President and Professor, Bilkent University, Ankara				
		B R E A K : R E F R E S H M E N T S				
PARALLEL SESSIONS		**Session A: Main Bldng (Rektörlük) Blue Room (Mavi Salon)**	**Session B Main Bldng (Rektörlük) Green Room (Yeşil Salon)**	**Session C Main Bldng (Rektörlük) Üzeyir Garih**	**Session D Engineering B306**	**Session E Engineering B307**
		A1 - Renewable Energy Systems Chair: **Bertrand Fankam**	**B1 - Heat Transfer in Nanofluids** Chair: **Ahmet Can Sabuncu**, Co-Chair: **Ali Beskok**	**C1 - Control Theoy** Chair: **Amit Ailom**	**D1 - Vibrations-1** Chair: **Alper Erturk**	**E1 - CFD and Heat Transfer** Chair: **Abel Hernandez-Guerrero**
11:00-11:15	1	**24171**	**24044**	**25131**	**24275**	**24081**
11:15-11:30	2	**24349**	**24242**	**24076**	**24593**	**24117**
11:30-11:45	3	**24373**	**25149**	**24103**	**25309**	**24226**
11:45-12:00	4	**24501**	**24047**	**24247**	**24912**	**24628**
12:00-13:30		**L U N C H**				
		Keynote Lecture, Main Building (Rektörlük), Conference Hall: İnan Kıraç				
13:30-14:25		**Nam Pyo Suh,** President, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea Lecture Title: **INNOVATIVE ENGINEERING SYSTEMS DESIGNED AND DEVELOPED AT KAIST - OLEV AND MH** Chair: **Nilufer Egrican**, Vice President, Yeditepe University, Istanbul				
		A2 - Product Formation in Combustion-1 Chair: **Enrico Sciubba**	**B2 - Micro and Nano Flows-1** Chair: **Ali Beskok** Co-Chair: **Ahmet Can Sabuncu**	**C2 - Control Applications-1** Chair: **Koray K. Safak**	**D2 - Vibrations-2** Chair: **Alper Erturk**	**E2 - CFD and Heat Transfer** Chair: **Abel Hernandez-Guerrero**
14:30-14:45	5	**24170**	**24107**	**24426**	**24604**	**25034**
14:45-15:00	6	**24566**	**24241**	**24729**	**24613**	**25015**
15:00-15:15	7	**24663**	**24436**	**25185**	**25200**	**24892**
15:15-15:30	8	**24129**	**24900**	**24105**	**24887**	
15:30-15:40		**S H O R T B R E A K**				
		A3 - Product Formation in Combustion-2 Chair: **Enrico Sciubba**	**B3 - Micro and Nano Flows-2** Chair: **Ali Beskok** Co-Chair: **Ahmet Can Sabuncu**	**C3 - Mechatronics** Chair: **Levent Guvenc**	**D3 - Noise and Vibration** Chair: **Koray Şafak**	**E3 - Science in Education Engineering** Chair: **John Rogers**
15:40-15:55	9	**24192**	**25234**	**24675**	**24277**	**24213**
15:55-16:10	10	**24486**	**25239**	**24755**	**24834**	**24502**
16:10-16:25	11	**25314**	**25287**	**25257**	**24608**	**24727**
16:25-16:50	12			**24631**		**24827**
16:40-17:00		**B R E A K : R E F R E S H M E N T S**				
		A4 - Wind Energy Chair: **Carlo Romanò**	**B4 - Atomic Force Microscopy** Chair: **Ali Beskok** Co-Chair: **Ahmet Can Sabuncu**			**E4 - Mechanical Engineering Education** Chair: **John Rogers**
17:00-17:15	13	**24054**	**24394**			**24883**
17:17-17:30	14	**24207**	**24499**			**24057**
17:30-17-45	15	**24262**	**24683**			**24143**
17:45-18:00	16	**25251**	**25139**			**24494**
18:00-18:15	17					
19.00-20.00		**Presentation: ISTANBUL - CITY OF CITIES; Conference Hall: Rektörlük, İnan Kıraç**				
		A vivid portrait of Byzantium, Constantinople and Istanbul, known in antiquity as the “City of Cities”. The life and arts of Byzantine Emperors and Ottoman Sultans and of modern Turkey. This program, full of fascinating legends, historical episodes and poetry, features more than a hundred colour slides depicting the excitement, architectural splendor and artistic creativity of the “Queen City”.				
20:00-23.00		**R E C E P T I O N**				

Program				
Registration				
Opening Session, Main Building (Rektörlük), Conference Hall: İnan Kıraç				
Keynote Lecture, Conference Hall: İnan Kıraç **Dan Mote, Jr.** President, University of Maryland, Glenn L. Martin Institute Professor of Engineering Lecture Title: **NURTURING INNOVATION** Chair: Adnan Akay, Vice President and Professor, Bilkent University, Ankara				
B R E A K : R E F R E S H M E N T S				
Session F **Engineering B308**	**Session G** **Engineering B309**	**Session H** **Engineering B310**	**Session J** **Engineering B311**	**Session K** **Engineering B312**
F1 - Tribology-1 Chair: **Satish V. Kailas**	**G1 - Computational mechanics of materials and structures** Chair: **Ionita Mariana**	**H1 - General Topics in Heat Transfer-1** Chair: **Farshad Kowsary**	**J1 - Vehicle Safety-1** Chair: **Serpil Acar**	**K1 - Cavitation & Sprays-1** Chair: **Feng Lai**
25070	**24833**	**24124**	**24027**	**24045**
24367	**24296**	**24240**	**24346**	**24332**
25047	**25340**	**24544**	**24659**	**24554**
	25439	**25042**	**24766**	
L U N C H				
Keynote Lecture, Main Building (Rektörlük), Conference Hall: İnan Kıraç **Nam Pyo Suh,** President, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea Lecture Title: **INNOVATIVE ENGINEERING SYSTEMS DESIGNED AND DEVELOPED AT KAIST - OLEV AND MH** Chair: **Nilufer Egrican**, Vice President, Yeditepe University, Istanbul				
F2 - Tribology-2 Chair: **Satish V. Kailas,**	**G2 - Computational mechanics of materials and structures** Chair: **Ionita Mariana**	**H2 - General Topics in Heat Transfer-2** Chair: **Artur J Jaworski**	**J2 - Vehicle Safety-2** Chair: **Serpil Acar**	**K2 - Cavitation & Sprays-2** Chair: **Cahit Evrensel**
24245	**24803**	**24197**	**25297**	**24606**
25302	**24516**	**24467**	**25398**	**24694**
24547	**24664**	**25173**	**25098**	**24823**
	24546	**25336**	**25293**	**25266**
S H O R T B R E A K				
F3 - Tribology-3 Chair: **Daniel de Mello**	**G3 - Computational mechanics of materials and structures** Chair: **Ibrahim Ozkol**	**H3 - Heat Transfer in Nanofluids and Microchannels** Chair: **Selin Aradag**	**J3 - Vehicle Dynamics & Control-1** Chair: **Samim Ünlüsoy** Co-Chair: **Kutluk B. Arıkan**	**K3 - Pumps & Turbomachinery** Chair: **Ryoichi Amano**
24280	**25072**	**25192**	**24451**	**24645**
24282	**24246**	**25235**	**24487**	**24744**
25347	**25069**	**25237**	**24679**	**24756**
24559	**25064**			
B R E A K : R E F R E S H M E N T S				
F4 - Tribology-4 Chair: **Daniel de Mello**	**G4 - Computational mechanics of materials and structures** Chair: **Ibrahim Ozkol**	**H4 - Radiation & multiphase heat transfer** Chair: **Artur J. Jaworski**	**J4 - Vehicle Dynamics & Control-2** Chair: **Samim Ünlüsoy** Co-Chair: **Kutluk B. Arıkan**	**K4 - Instability, Turbulence & Shear Flows** Chair: **Michael Plesniak**
24569	**24856**	**24651**	**24768**	**24408**
24638	**25335**	**24820**	**24809**	**24666**
24793	**25440**	**24961**	**24963**	**24094**
24840	**24191**	**25432**	**24293**	**24315**
	25059			
Presentation: ISTANBUL - CITY OF CITIES; Conference Hall: Rektörlük, İnan Kıraç A vivid portrait of Byzantium, Constantinople and Istanbul, known in antiquity as the "City of Cities". The life and arts of Byzantine Emperors and Ottoman Sultans and of modern Turkey. This program, full of fascinating legends, historical episodes and poetry, features more than a hundred colour slides depicting the excitement, architectural splendor and artistic creativity of the "Queen City".				
R E C E P T I O N				

ESDA2010 CONFERENCE SCHEDULE, Tuesday, 13 July 2010

Time		Program				
8:00		Registration for One-day Delegates				
PARALLEL SESSIONS		**Session A: Main Bldng (Rektörlük) Blue Room (Mavi Salon)**	**Session B Main Bldng (Rektörlük) Green Room (Yeşil Salon)**	**Session C Main Bldng (Rektörlük) Üzeyir Garih**	**Session D Engineering B306**	**Session E Engineering B307**
		A5 - Design and Analysis of Energy Systems-1 Chair: **Emrullah Cayir**	**B5 - Micro-and Nano-Mechanics-1** Chair: **Ali Beskok** Co-Chair: **A. Can Sabuncu**	**C5 - Biomechanics and Rehabilitation** Chair: **Fethi Okyar**	**D5 - Modeling and Identification-1** Chair: **Alberto Doria**	**E5 - Mechanics of Materials-1** Chair: **Serhat Erpolat**
9:00-9:15	18	**24024**	**24400**	**24313**	**24272**	**24138**
9:15-9:30	19	**24351**	**24473**	**24371**	**24585**	**24139**
9:30-9:45	20	**24474**	**24592**	**24732**	**24779**	**24206**
9:45-10:00	21	**24828**	**25320**	**25254**	**24752**	**25294**
10:00-10:15	22		**25370**		**25306**	
		A6 - Design and Analysis of Energy Systems-2 Chair: **Emrullah Cayir**		**C6 - Bone and Joint Mechanics** Chair: **Fethi Okyar**		**E6 - Mechanics of Materials-2** Chair: **Serhat Erpolat**
10:15-10:30	23	**24878**		**24286**		**24587**
10:30-10:45	24	**25212**		**25230**		**24841**
10:45-11:00	25	**25444**		**25329**		**24875**
11:00-11:20		**B R E A K : R E F R E S H M E N T S**				
		Keynote Lecture, Main Building (Rektörlük), Conference Hall: İnan Kıraç				
11:20-12:25		**Adnan Akay**, Vice President and Professor, Bilkent University, Ankara, Turkey Lecture Title: **DISSIPATION AND IRREVERSIBLE ENERGY TRANSFER IN DYNAMIC SYSTEMS** Chair: **Sadik Kakac**, Professor, TOBB University of Economics and Technology Ankara				
12:15-13:30		**L U N C H**		**L U N C H**		
		Keynote Lecture, Main Building (Rektörlük), Conference Hall: İnan Kıraç				
13:30-14:25		**Hugh Spikes**, Professor of Lubrication, Imperial College, London, UK Lecture Title: **RECENT ADVANCES IN LIQUID LUBRICATION RESEARCH** Chair: **Ali Erdemir**, Senior Scientist, Argonne National Laboratory, Argonne, IL, USA				
		A7 - Fuel Cells Chair: **Claudia Toro**	**B7 - Micro/Nano Fabrication and Materials-1** Chair: **Ali Beskok** Co-Chair: **A.C.Sabuncu**	**C7 - Biofluid Mechanics** Chair: **Abdullah A Alshorman**	**D7 - Friction Induced Vibrations** Chair: **Tory Butlin**	**E7 - Mechanics of Materials-3** Chair: **Fethi Okyar**
14:30-14:45	26	**24598**	**24176**	**24112**	**24576**	**25113**
14:45-15:00	27	**24059**	**24237**	**24534**	**24814**	**24720**
15:00-15:15	28	**24507**	**24334**	**24804**	**25246**	**25213**
15:15-15:30	29	**25418**	**25226**	**25116**	**25450**	**25248**
15:30-15:40		**S H O R T B R E A K**				
		A8 - Refrigeration Systems-1 Chair: **Vittorio Verda**	**B8 - Micro/Nano Fabrication and Materials-2** Chair: **Ali Beskok** Co-Chair: **AC Sabuncu**	**C8 - Control Methods-1** Chair: **Jerry M. Chen**	**D8 - Analysis, Design and Simulation-1** Chair: **Kenan Sanliturk**	**E8 - Elasticity & Fatique-1** Chair: **Ali Cinar**
15:40-15:55	30	**24156**	**24504**	**24303**	**24153**	**25247**
15:55-16:10	31	**24690**	**25250**	**24989**	**24268**	**24219**
16:10-16:25	32	**24763**	**25252**	**25371**	**24607**	**24230**
16:25-16:50	33	**24863**	**25255**	**24342**	**24599**	**24575**
16:40-17:00		**B R E A K : R E F R E S H M E N T S**				
		A9 - Advanced Energy Systems-2 Chair: **Giovanni Bracco**	**B9 - Micro/Nano Fabrication and Materials-3** Chair: **Ali Beskok** Co-Chair: **AC Sabuncu**	**C9 - Control Methods-2** Chair: **Jerry M. Chen**	**D9 - Analysis, Design and Simulation-2** Chair: **Kenan Sanliturk**	**E9 - Elasticity & Fatique-2** Chair: **Ali Cinar**
17:00-17:15	34	**24120**	**25095**	**24102**	**24902**	**24202**
17:17-17:30	35	**24323**	**25162**	**24026**	**25194**	**24680**
17:30-17-45	36	**24888**	**25022**	**24383**	**25220**	**24972**
17:45-18:00	37	**24574**	**25103**	**24847**	**25341**	**25030**
18:00-18:15	38			**24379**	**25228**	
18:30		**D E P A R T F R O M Y E D I T E P E U N I V E R S I T Y C A M P U S**				
19:30-23:30		**G A L A D I N N E R**				

Program				
Registration for One-day Delegates				
Session F **Engineering B308**	**Session G** **Engineering B309**	**Session H** **Engineering B310**	**Session J** **Engineering B311**	**Session K** **Engineering B312**
F5 - **Surface Engineering-1** Chair: **Carlo Alberto Biffi**	**G5 - Computational mechanics of materials and structures** Chair: **Volkan Esat**	**H5 - Heat Transfer in jet Flows-1** Chair: **Farsad Kowsary**	**J5 - Vehicle Design and Manufacturing** Chair: **Ali Göktan**	**K5 -** **CFD&Flow Simulation-1** Chair: **Andrzej Nowakowski**
25262	**24936**	**24115**	**24276**	**24232**
24464	**25011**	**24362**	**24482**	**24302**
24410	**24298**	**24661**	**25124**	**25136**
		25363	**24925**	**24433**
F6 - **Surface Engineering-2** Chair: **Carlo Alberto Biffi**	**G6 - Computational mechanics of materials and structures** Chair: **Volkan Esat**		**J6 - Alternative Drive Systems** Chair: **Ali Göktan**	**K6 – CFD & Flow Simulation-2** Chair: **Andrzej Nowakowski**
24590	**25040**		**25284**	**24654**
24909	**24698**		**24643**	**24832**
25153	**25334**		**24702**	
B R E A K : R E F R E S H M E N T S				
Keynote Lecture, Main Building (Rektörlük), Conference Hall: İnan Kıraç				
Adnan Akay, Vice President and Professor, Bilkent University, Ankara, Turkey Lecture Title: **DISSIPATION AND IRREVERSIBLE ENERGY TRANSFER IN DYNAMIC SYSTEMS** Chair: **Sadik Kakac**, Professor, TOBB University of Economics and Technology Ankara				
L U N C H		**L U N C H**		
Keynote Lecture, Main Building (Rektörlük), Conference Hall: İnan Kıraç				
Hugh Spikes, Professor of Lubrication, Imperial College, London, UK Lecture Title: **RECENT ADVANCES IN LIQUID LUBRICATION RESEARCH** Chair: **Ali Erdemir**, Senior Scientist, Argonne National Laboratory, Argonne, IL, USA				
F7 - **Surface Engineering-3** Chair: **Michael Nosonovsky**	**G7 - Performance and Control of Manufacturing Systems** Chair: **Ismail Fidan** Co-Chair: **Niklas Halfmann**	**H7 - Heat exchangers, Sinks and Fins-1** Chair: **Almila Guvenc Yazicioglu**	**J7 - Vehicle Design and Manufacturing** Chair: **Li Han**	**K7 - Reacting & High Speed Flows** Chair: **Onur Tuncer**
25071	**25033**	**24018**	**24289**	**24614**
25056	**24783**	**24218**	**24290**	**24858**
24985	**24816**	**24269**	**25024**	**25001**
	24460		**25411**	**25081**
S H O R T B R E A K				
F8 - Modelling, Simulation & Testing of Adv. Materials-1 Chair: **Mahmut Aksit**	**G8 - Design, Manufacturing and Systems Integration** Chair: **Ismail Fidan** Co-Chair: **Emrullah Cayir**	**H8 - Heat exchangers, Sinks and Fins-1** Chair: **Almila Guvenc Yazicioglu**	**J8 - CFD and Heat Transfer-1** Chair: **Muhammad Abid**	**K8 - Design Engineering-2** Chair: **Zuhal Erden**
24220	**24221**	**24485**	**24080**	**25097**
24801	**25084**	**24570**	**24201**	**24565**
24167	**24524**	**24712**	**25375**	**24324**
	25260	**24760**	**25433**	
B R E A K : R E F R E S H M E N T S				
F9 - Modelling, Simulation & Testing of Adv. Materials-2 Chair: **Mahmut Aksit**	**G9 - Design and Simulation of CNC Systems** Chair: **Ismail Fidan,** Co-Chair: **Marco Grasso**	**H9 – Thermal Management of Electronic Devices** Chair: **Adrian Plesca**	**J9 - CFD and Heat Transfer-2** Chair: **Muhammad Abid**	**K9 - Design Engineering-3** Chair: **Zuhal Erden**
24797	**24225**	**24196**	**24445**	**24222**
24055	**25190**	**24441**	**24325**	**24775**
24385	**24923**	**25080**	**25114**	**25180**
24389	**25049**	**25374**	**24224**	
	24867	**24493**	**24051**	
D E P A R T F R O M Y E D I T E P E U N I V E R S I T Y C A M P U S				
G A L A D I N N E R				

ESDA2010 CONFERENCE SCHEDULE, Wednesday, 14 July, 2010

Time		Program				
8:00		Registration for One-day Delegates				
PARALLEL SESSIONS		**Session A: Main Bldng (Rektörlük) Blue Room (Mavi Salon)**	**Session B Main Bldng (Rektörlük) Green Room (Yeşil Salon)**	**Session C Main Bldng (Rektörlük) Üzeyir Garih**	**Session D Engineering B306**	**Session E Engineering B307**
		A10 - Gas and Steam Power Plants Chair: **Maria Grazia De Giorgi**	**B10 - Theoretical and Computational Kinematics** Chair: **Koray K. Safak**	**C10 - Bioengineering Technologies-1** Chair: **Ali Umit Keskin**	**D10 - Design Engineering-4** Chair: **Rene Leitner**	**E10 - Structural Vibrations-1** Chair: **Iliena Bodini**
9:00-9:15	39	**24660**	**24560**	**24361**	**24453**	**24100**
9:15-9:30	40	**24817**	**25278**	**24603**	**24665**	**24713**
9:30-9:45	41	**25035**	**24695**	**25233**	**24884**	**24759**
9:45-10:00	42		**24919**	**25385**	**24036**	**25218**
		A11 - Exergetic and Thermoeconomic Analysis Chair: **Carlo Roselli**	**B11 - MEMS/NEMS and Nano-Electronics** Chair: **Ali Beskok** Co-Chair: **Ahmet Can Sabuncu**	**C11 - Bioengineering technologies-1** Chair: **Ali Umit Keskin**		**E11 - Structural Vibrations-2** Chair: **Vedat Karadağ**
10:00-10:15	43	**24214**	**24443**	**25449**		**24101**
10:15-10:30	44	**24239**	**24751**	**24155**		**24106**
10:30-10:45	45	**24997**	**24769**	**25416**		**24340**
10:45-11:00	46	**25137**				
10:45-11:15	**B R E A K : R E F R E S H M E N T S**					
		Keynote Lecture, Room: Main Building (Rektörlük), Conference Hall: İnan Kıraç				
11:15-12:10		**Nihat Berker,** President , Sabanci University, Istanbul, Turkey Lecture Title: **UNDERGRADUATE EDUCATION WITH FOCUS ON RESEARCH** Chair: **Memis Acar**, Professor, Loughborough University, UK				
12:10-13:30	**L U N C H**			**L U N C H**		
		A12 - Dynamical Systems-1 Chair: **Stefano Zucca**	**B12 - Robot Dynamics and Control-1** Chair: **Meng-Shiun Tsai**	**C12 - Mechatronics-Control and AI** Chair: **David Bradley**	**D12 - Design Engineering-5 Chair: Eric Gbadam**	**E12 - Structural Vibrations-3** Chair: **Vedat Karadağ**
13:30-13:45	47	**24130**	**25404**	**24725**	**24636**	**24007**
13:45-14:00	48	**24264**	**24020**	**24733**	**24545**	**25193**
14:00-14:15	49	**24948**	**25312**	**25004**	**24099**	**25249**
14:15-14:30	50	**24189**		**25108**	**25431**	**24861**
14:30-14:40	**S H O R T B R E A K**					
		A13 - Dynamical Systems-2 Chair: **Stefano Zucca**	**B13 - Robot Dynamics and Control-2** Chair: **Vladimir Filaretov**	**C13 - System Analysis and Modelling in Mechatronics** Chair: **David Bradley**	**D13 - Design Engineering-6** Chair: **Eric Gbadam**	**E13 – Design, Dynamics & Vibrations** Chair: **Evgenia Kirillova**
14:45-15:00	51	**24969**	**24200**	**24254**	**24121**	**25021**
15:00-15:15	52	**25395**	**24203**	**24365**	**24043**	**24452**
15:15-15:30	53	**25090**	**24249**	**24880**	**24904**	**24906**
15:30-15:45	54	**25436**	**24535**	**25150**	**24437**	**25430**
15:45-16:00	55		**25178**			
15:45-16:15	**B R E A K : R E F R E S H M E N T S**					
		A14 - Impact/Acoustics Chair: **Yuri Spirochkin**	**B14 - Robot Dynamics and Control-3** Chair: **Vladimir Filaretov**	**C14 - Mechatronic Devices, Components and Systems** Chair: **David Bradley**	**D14 - Design Engineering-7** Chair: **Rene Leitner**	**E14 - Vehicle Vibration and control** Chair: **Nejat Tuncay**
16:15-16:30	56	**24188**	**24966**	**24916**	**25197**	**24624**
16:30-16:45	57	**24739**	**25026**	**24979**	**24964**	**24518**
16:45-17:00	58	**24782**	**24588**	**24157**	**24132**	**24905**
17:00-17:15	59	**25089**	**25270**	**25291**	**24993**	**24629**
17:15-17:30	60					
17:30-18:00	**B R E A K**					
18:30	**TRANSFER TO BOSPHORUS FROM YEDITEPE UNIVERSITY CAMPUS**					
19:30-23.30	**B O A T T O U R O N B O S P H O R U S A N D D I N N E R**					

Program				
Registration for One-day Delegates				
Session F Engineering B308	**Session G Engineering B309**	**Session H Engineering B310**	**Session J Engineering B311**	**Session K Engineering B312**
F10 - Adv. Materials & Processes-1 Chair: **Ali Beskok**	**G10 - Forming and Forging Technologies-1** Chair: **Somer M. Nacy**	**H10 - Convection Heat Transfer-1** Chair: **Sheam-Chyu Lin**	**J10 - Engine Design and Emissions-1** Chair: **Cem Sorusbay**	**K10 - Design Engineering-9** Chair: **Abdulkerim Kar**
24562	**25118**	**24070**	**24031**	**24510**
24572	**25122**	**24144**	**24215**	**25078**
24549	**25195**	**24154**	**25043**	**25196**
24980	**25288**	**24466**	**24119**	**25346**
F11 - Adv. Materials & Processes-2 Chair: **Ali Erdemir**	**G11 - Forming and Forging Technologies-2** Chair: **Miroslava Kostalova**	**H11 - Convection Heat Transfer-2** Chair: **Sheam-Chyu Lin**	**J11 - Engine Design and Emissions-2** Chair: **Cem Sorusbay**	**K11 - Design Engineering-1** Chair: **Abdulkerim Kar**
24005	**25202**	**24402**	**25145**	**24370**
24943	**25219**	**24476**	**24746**	**25376**
25008	**25263**	**24353**	**25076**	**24448**
	25333	**24077**	**24253**	**25271**
B R E A K : R E F R E S H M E N T S				
Keynote Lecture, Room: Main Building (Rektörlük), Conference Hall: İnan Kıraç				
Nihat Berker, President , Sabanci University, Istanbul, Turkey Lecture Title: **UNDERGRADUATE EDUCATION WITH FOCUS ON RESEARCH** Chair: Memis Acar, Professor, Loughborough University, UK				
L U N C H				
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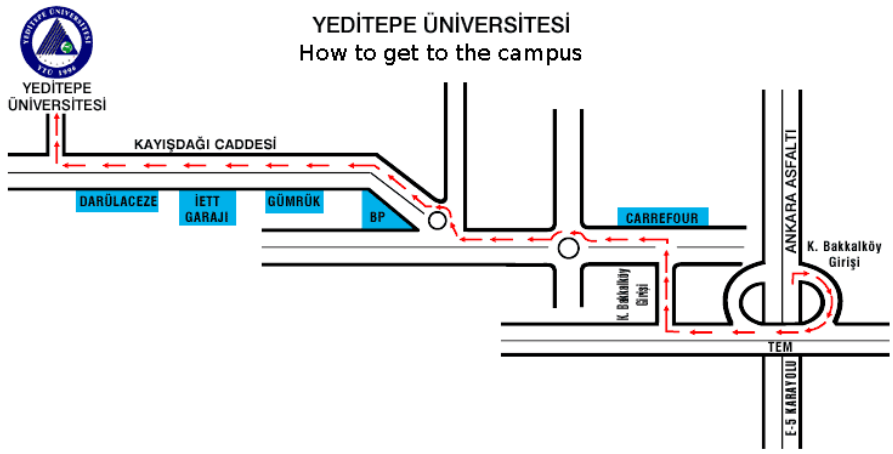

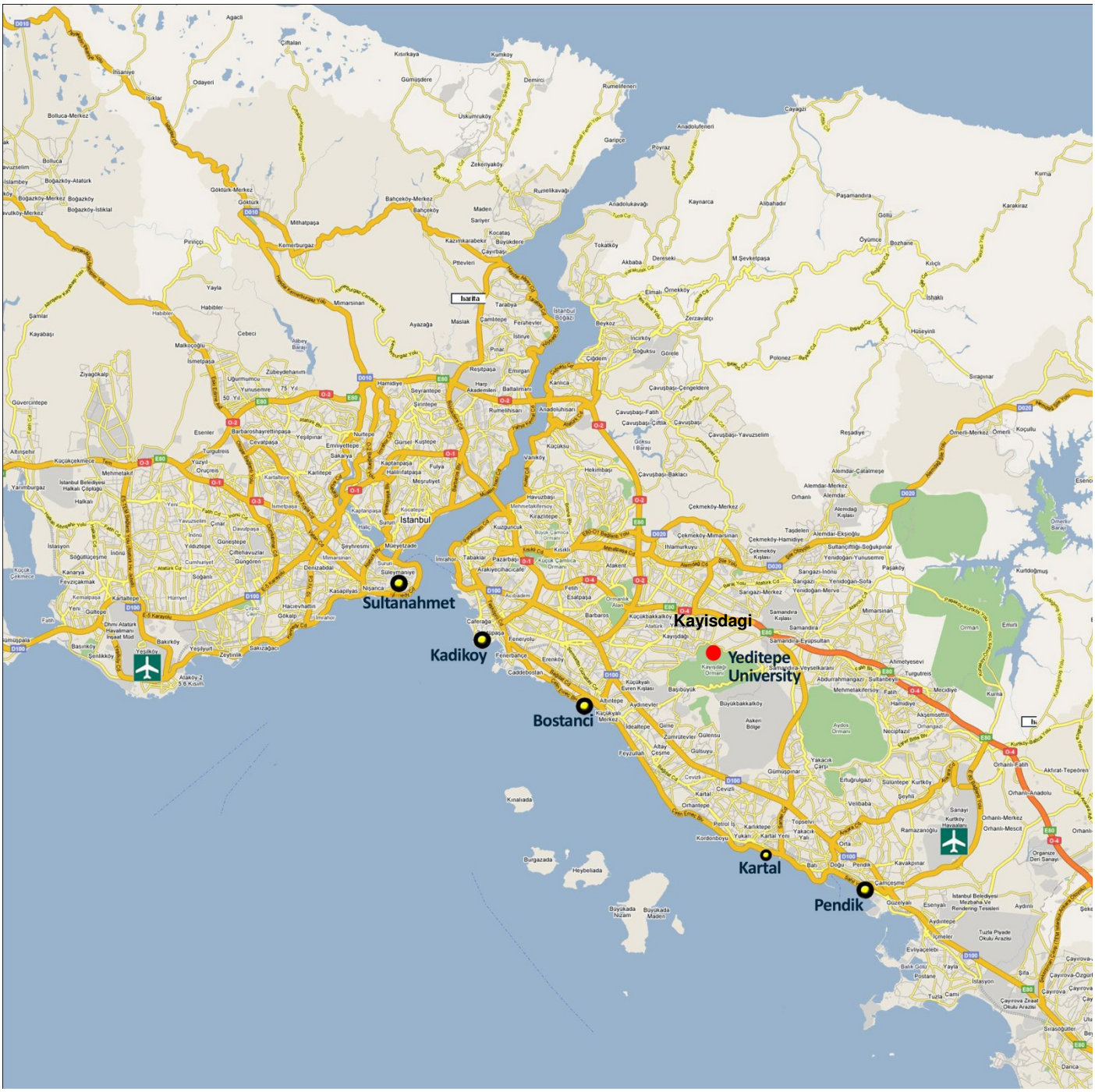

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