



上海交通大学

Shanghai Jiao Tong University

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About SJTU



Shanghai Jiao Tong University (SJTU), directly subordinate to the Ministry of Education, is a key university in China, jointly run by the Ministry and Shanghai Municipality. >>>**SJTU Today video**

Shanghai Jiao Tong University formerly the Nang Yang Public School was founded in 1896 by Mr. SHENG Xuanhui. It is one of the oldest universities in China. The University, through its century-long history, has nurtured large numbers of outstanding figures and made significant contributions to the thriving and prosperity of the nation and the development of science and technology. Its famous alumni include JIANG Zemin, LU Dingyi, DING Guangen, WANG Daohan, QIAN Xuesen, WU Wenjun, ZOU Taofen, MAO Yisheng, CAI Er, HUANG Yanpei, SHAO Lizi, WANG An and so on. Of all the academicians of China's Academy of Sciences and Academy of Engineering, more than 200 are the alumni of Jiao Tong University.

Since its adoption of the reform and opening up policy in China, SJTU has taken the lead in the management system reform in the institutions of higher learning, thus regaining its vigor and vitality as well as momentum for rapid growth as never seen before. A number of its disciplines have been advancing towards the world's first-class level, such as communication and electronic system, naval architecture and ocean engineering, automatic control, composite materials, and metal plasticity processing. A batch of burgeoning branches of learning have occupied an important position in the country, such as Large-scale integrated circuit, computer science, optical fiber technology, systems engineering.

Today SJTU boasts 20 academic schools: the schools of Naval Architecture and Ocean Engineering, Mechanical & Power Engineering, Electronics & Electric Engineering, Material Science and Engineering, Sciences, Life Science and Technology, Humanities and Social Science, Civil Engineering and Mechanics, Chemistry and Chemical Engineering, Management, International and Public Affairs, Foreign Languages, Agriculture and Biology, Environmental Science and Engineering, Pharmaceutics, Medical, Law, Media & Design, Micro-electronics, Information Security, Software and 2 directly affiliated departments: Department of Plastic Technology and the Department of Physical Education, plus a Graduate School. Besides, it also has School of Continuing(adult) Education, School of Online Learning, School of International Education, and a Vocational School. There are 60 undergraduate programs, 152 masters-degree programs, 93 Ph.D programs, 16 post-doctorate programs, 16 State key doctorate programs and 14 State key laboratories and National engineering centers.

SJTU boasts a good number of famous scientists and professors, including 22 academicians of the Academy of Sciences and Academy of Engineering, 31 "Changjiang Chair Professors" and more than 1, 420 professors and associate professors.

Its total enrollment of full-time students amounts to 38,000. There are 18,000 undergraduates and 18,100 candidates for Master's Degree and Doctor's Degree. The centennial Jiao Tong University has inherited its old tradition "high starting points, solid foundation, strict requirements and extensive practice" which has cultivated one group of qualified students after another. Today the old tradition is endowed with new content and has become the fine style of learning of Jiao Tong students. With such tradition SJTU is training students into excellent qualified talents with solid and broad theoretical foundation, complex knowledge structure, international communicative ability and comprehensive development in morality, intelligence and physical fitness. Students from SJTU have achieved top prizes in various competitions, such as the International Mathematical Contest in Modeling and Electronics Design Contest. Teachers from SJTU have won a number of top prizes in the national Award of outstanding achievements in Education for their teaching, research and textbooks compiled.

SJTU has beautiful campuses, occupying an area of more than 200 hectare in total, and possesses plenty of advanced teaching and research equipment and facilities. Now, it has six campuses, the Xuhui, the Minhang, the Qibao, the Shangzhong Road, the Fahuazheng Road and the Chongqing Road(south). Over the past decade, the number of students in SJTU has grown from 5,000 to more than 38,000, the floorage of various buildings from 230,000 square meters to 800,000 square meters, and the area of campuses from 40ha to 200ha. Apart from the major buildings such as the Lecture Buildings, Laboratory Buildings, Dormitories and Gymnasiums, SJTU also has the Bao Zhaolong Library which is well-known throughout the country. Various laboratories, including university central laboratories such as "Computer Center" and "Audio-visual Education Center" are equipped with advanced research and teaching equipment and facilities.

SJTU has been actively involved in International academic exchange programs with foreign universities. To date, it has established relations with more than 100 renowned universities and colleges in the world as well as connections with many research institutions, corporations and enterprises at home and abroad. SJTU has invited more than 100 famous scientists and specialists as honorable professors or consulting professors, including the Nobel prize winners and physicists Yang Zhenning, Li Zhengdao and Ding Zaozhong. SJTU sends excellent teachers and students abroad every year to give lectures, to study or to attend international academic conferences, meanwhile SJTU invites foreign specialists and scholars to give lectures or to have academic exchanges. SJTU is the nodal point of "China Education Science and Research Networks" in east China region, and through computer networks, SJTU has faster and closer connection with universities, scientific research institutions and corporations both at home and abroad.

In the new century, SJTU has formulated a grand blueprint for future development and is determined to make continued efforts to build itself into a first class university in the world.



机械与动力工程学院

Shanghai Jiao Tong University School of Mechanical Engineering

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 地址：上海市东川路800号闵行机械楼群 邮编：200240 E-mail: qwzhou@sjtu.edu.cn



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Energy Fundamentals and Future Outlook

By M. Kostic, PhD, PE,
Professor of Mechanical Engineering,
NORTHERN ILLINOIS UNIVERSITY USA

Date: January 6, 2009

Time: 10:00 am

Place: Room F 310, Mechanical Engineering Building

School of Mechanical Engineering
Shanghai Jiaotong University

Abstract

Energy is a fundamental property of a physical system and refers to its potential to maintain a material system identity or structure (forced field in space) and to influence changes (via forced-displacement interactions, i.e. systems' re-structuring) with other systems by imparting work (forced directional displacement) or heat (forced chaotic displacement/motion of a system molecular or related structures). Energy exists in many forms: electromagnetic (including light), electrical, magnetic, nuclear, chemical, thermal, and mechanical (including kinetic, elastic, gravitational, and sound); where, for example, electro-mechanical energy may be kinetic or potential, while thermal energy represents overall potential and chaotic motion energy of molecules and/or related micro structure. Energy is the "building block" and fundamental property of matter and space and, thus, the fundamental property of existence. Energy exchanges or transfers are associated with all processes (or changes) and, thus, are indivisible from time.

At present, most of the World energy consumption is supplied by the fossil fuels (about 85%). However, the proven fossil fuel reserves are limited, and if continued to be used at the present rates, they will be depleted in relatively short period of time. At present, a substantial amount of World electricity is obtained from nuclear and hydro energy (close to 20% each), respectively, and use of other renewable energy resources is increasing, namely geothermal, wind, biomass and solar, as well as development of alternative synthetic fuels, including hydrogen, etc. It is worth noting that some countries produce almost all or most of their electricity from hydro energy (like Norway, Brazil, New Zealand, Austria and Switzerland), and France produces most of its electricity from nuclear fuel (close to 80%). The nuclear fuel reserves are orders of magnitude higher than fossil fuels, and nuclear plants do not contribute to CO₂ green-house pollution. Furthermore, advances in energy conversion and utilization technologies and increase in efficiency, including computerized control and management, contribute to energy conservation, increase in safety, and reduction of related environmental pollution. Actually, per capita energy use in the U.S. and other developed countries is being reduced in recent years. However, the increase of World's population and development of many underdeveloped and very populated countries, like China, India and others, will influence continuous increase of the World energy consumption.

The two things are certain in not distant future: (1) the world population and their living-standard expectations will substantially increase, and (2) fossil fuels' economical reserves, particularly oil and natural gas, will substantially decrease. The difficulties that will face every nation and the world in meeting energy needs over the next several decades will be more challenging than what we anticipate now. The traditional

solutions and approaches will not solve the global energy problem. New knowledge, new technology, and new living habits and expectations must be developed to address both the quantity of energy needed to increase the standard of living world-wide and to preserve and enhance the quality of our environment. However, regardless of imminent shortages of fossil fuels, the outlook for future energy needs is encouraging. There are many diverse and abundant energy sources with promising future potentials, so that mankind should be able to enhance its activities, standard and quality of living, by diversifying energy sources, and by improving energy conversion and utilization efficiencies, while at the same time increasing safety and reducing environmental pollution. After all, the life may be happier after the fossil fuel era!

About the Speaker:

Professor Kostic's teaching and research interests are in Thermodynamics (a science of energy, the Mother of All Sciences), Fluid Mechanics, Heat Transfer and related fluid-thermal-energy sciences; with emphases on physical comprehension and creative design, experimental methods with computerized data acquisition, and CFD simulation; including nanotechnology and development of new-hybrid, POLY-nanofluids with enhanced properties, as well as design, analysis and optimization of fluids-thermal-energy components and systems in power-conversion, utilizations, manufacturing and material processing. Dr. Kostic came to Northern Illinois University from the University of Illinois at Chicago, where he supervised and conducted a two-year research program in heat transfer and viscoelastic fluid flows, after working for some time in industry.

Dr. Kostic has received recognized professional fellowships and awards, including multiple citations in Marquis' "Who's Who in the World" and "Who's Who in Science and Engineering."; the Fulbright Grant; NASA Faculty Fellowship; Sabbatical Semester at Fermilab as a Guest Scientist; and the summer Faculty Research Participation Program at Argonne National Laboratory. He is a frequent reviewer of professional works and books in Thermodynamics and Experimental Methods. Dr. Kostic is a licensed professional engineer (PE) in Illinois and a member of the ASME, ASEE, and AIP's Society of Rheology. He has a number of publications in refereed journals, including invited state-of-the-art chapters in the Academic Press series Advances in Heat Transfer, Volume 19, and "Viscosity" in CRC Press' Measurement, Instrumentation and Sensors Handbook; as well as invited reference articles: Work, Power, and Energy in Academic Press/Elsevier's Encyclopedia of Energy; Extrusion Die Design in Dekker's Encyclopedia of Chemical Processing; and Energy: Global and Historical Background and Physics of Energy in Taylor & Francis/CRC Press Encyclopedia of Energy Engineering and Technology. Professor Kostic is a member of the Graduate Faculty at Northern Illinois University.

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地址: 上海市东川路800号闵行机械楼群 邮编: 200240 E-mail: qwzhou@sjtu.edu.cn