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SELECTED TOPICS ON APPLIED MATHEMATICS, CIRCUITS, SYSTEMS, AND SIGNALS 2009

**Proceedings of the 3rd International Conference on
Applied Mathematics, Simulation, Modelling
(ASM'09)**

**Proceedings of the 3rd International Conference on
Circuits, Systems and Signals
(CSS'09)**



Vouliagmeni, Athens, Greece, December 29-31, 2009

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Plenary Lecture 1

Green Economy, Sustainable Growth Theory and Demographic Dynamics: A Modern Theoretical Approach



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Abstract: The traditional neoclassical model of economic growth, first developed by Solow (1956) and Swan (1956), who independently proposed similar one-sector models, provides a theoretical framework for understanding world-wide growth of output and the persistence of geographical differences in per capita output. The key concept of this model, famously known as the Solow-Swan model, is the neoclassical form of production function with declining returns to capital combined with a fixed saving rate. On the basis of these assumptions, an economy, regardless of its starting point, converges to a balanced growth path, where long-run growth of output and capital are determined solely by the rate of labor-augmenting technological progress and the rate of population growth (see, for example, Barro and Sala-i-Martin, 1995). Ferrara and Guerrini (2008) have analyzed the role of a variable population growth rate within the Solow-Swan model by assuming a logistic-type population growth law. Within this set up, the model is proved to have a unique equilibrium, which is globally asymptotically stable. As well, its solution is shown to have a closed-form expression via Hypergeometric functions. As is typical in the neoclassical model, the human population size is assumed to be equal to the labor force. An assumption of that model, however, is that the growth rate of population is constant, yielding an exponential behavior of population size over time. Clearly, this type of time behavior is unrealistic and, more importantly, unsustainable in the very long-run. A more realistic approach would be to consider a logistic law for the population growth rate. Brock and Taylor (2004) have demonstrated that the Solow-Swan model and the environmental Kuznets curve (hereafter EKC) are intimately related (for the EKC, see, for example, Grossman and Krueger, 1995). Amending the Solow-Swan model to incorporate technological progress in abatement, the EKC is a necessary by-product of convergence to a sustainable growth path. The resulting model, which they called the Green-Solow model, generates an EKC relationship between the flow of pollution emissions and income per capita, and the stock of environmental quality and income per capita.

The main objective of this paper is to combine within the same framework these two different research lines that have been analyzed separately in the recent past. The two research lines we aim at joining together are, respectively, the one studying the effects of including emissions, abatement and a stock of pollution in the Solow-Swan model (Brock and Taylor, 2004), and that analyzing the role of a variable population growth rate within the Solow-Swan model (Ferrara and Guerrini, 2008). Within this framework, the economy is described by a three dimensional dynamical system, whose solution can be explicitly determined, and proved to be convergent in the long-run. Finally, we prove that sustainable growth occurs if technological progress in abatement is faster than technological progress in production. An EKC may result along the transition to the balanced growth path.

Brief Biography of the Speaker:

MASSIMILIANO FERRARA, was born in Pisa (Italy) on June 8, 1972. He graduated cum laude in 1995 in Economics at the University of Messina. Ph.D. (2001) with academic honors in "Mathematical Economics and Finance". Professor in "Mathematical Economics" since 2002. Vice-Rector of the University "Dante Alighieri" of Reggio Calabria (Italy). Head of the Economics Degree of the Mediterranean University of Reggio Calabria. Chief of the Chairs of Mathematical Economics and Economic Statistics at the Faculty of Law - Economics Degree - Mediterranean University of Reggio Calabria since 2007. Professor in the degree course on European Economics at the Faculty of Political Science, University of Milan, where he also is Professor of Decision Theory on the Master by title "Marketing Intelligence and Data Analysis". Head of the Economics Degree of the Mediterranean University of Reggio Calabria. Invited Speaker by WSEAS Conferences (Baltimore MACMESE '09 Morgan State University) by American Mathematical Society (Western Michigan University, USA) and Calcutta Mathematical Society, INDIA and Visiting Professor at the Lomonosov Moscow State University (Department of Mathematics), at the New Jersey Institute of Technology in NewArk (NJ) (USA), (Department of Mathematical Sciences), at the Eotvos Lorand University of Budapest (Department of Atomic Physics, Faculty of Sciences), at Politehnica of Bucharest (Department of

Mathematics). Author of 80 publications on international journals many of them "high impact Scientific International (ISI)" and 4 monographs. Member of Indian Academy of Mathematics (2008- current), Member of Accademia Peloritana dei Pericolanti (2003-current), Member of the Balkan Society of Geometers (2003- current), Member of the Scientific SET - Advances Center for Studies on Economic Theory - (Center for Advanced Studies Theoretical Economics) at the University of Milan Bicocca (2005-current), Member of the Mathematical Association of America (2007-current), Member of the SIEP (Societa italiana di Economia Pubblica) (2008-current),. Scientific Coordinator of international projects financed by the Ministry of Foreign Affairs: The Executive Programme of scientific and techonological cooperation between Italy and Romania during 2006- 2008 and of the Executive Programme of scientific and techonological cooperation between Italy and Estonia during 2005-2007. Editor and Referee of several International Journals. Official Reviewer of Mathematical Reviews (MathSciNet), Division of the American Mathematical Society and Zentralblatt MATH, reviews scientific journal published by the European Mathematical Society, the Heidelberg Academy of Sciences and Fachinformationszentrum Karlsruhe.

Plenary Lecture 2

Cooperative Effects in Closed Queueing Networks



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Abstract: A closed cycle of a mass consumption and a renewal of some product is investigated. For this aim a closed queueing network with a number of customers, a number of servers in a consumption node and service intensities proportional to a large parameter n is considered. The parameter n characterizes a network size. For $n \rightarrow \infty$ a law of zero and one is established for a probability that all consumers are satisfied. If the limit equals 0 a convergence by a probability to some b , $0 < b < 1$, of a part of satisfied consumers is proved. A problem of b maximization by the network route matrix Θ is solved. The maximization procedure consists of a finding of a route for some one-variable function and includes a definition of permissible solutions of some auxiliary transportation problem.

Plenary Lecture 3

On the Optimality of Multi Item Integrated Production Inventory Systems



Professor Zaid T. Balkhi

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Abstract: In some industrial systems like petrochemicals, the same raw materials are used in producing several products. However, most of the classical production inventory systems treat the economic order quantities (EOQ) of raw materials, which are used in producing certain final products, separately of the economic production quantities (EPQ) of these products. This may result in sub-optimization of both the (EOQ)'s of raw materials and the (EPQ)'s of final products. But, when raw materials are used in production, the ordering quantities for raw materials are dependent on the economic batch size and the schedule of the final products. By integrating the procurement and production subsystems, the degree of sub-optimality is reduced. In this paper, a unified inventory model of integrated production inventory systems, where each of production, demand and deterioration rates of final products and deterioration rates of raw materials are general functions of time, is considered. Shortages for final products are allowed but are partially backordered. All cost components are affected by both inflation and time value of money. The objective is to find an optimal production schedule for each product in any inventory cycle so that the overall total relevant inventory cost for these integrated systems is minimized. We develop an exact formula for the total inventory cost per unit of time. Then, we use rigorous mathematical methods to find the optimal production schedule for each final product of these integrated inventory systems.

Brief Biography of the Speaker:

Degrees .B.Sc. in mathematics (Probability and Mathematical Statistics Section) Damascus University 1971-High Diploma in pure mathematics ,Damascus University 1979 - Studying several post graduate courses in Optimization, Probability and Statistics Brussels University 1980 - Dr. of Science in applied mathematics (Belgian Ph.D in applied mathematics- OR oriented) with honors, University of Brussels 1983.

Positions :Professor in King Saud University, College of Science, Department of Statistics and Operations Research since May 2005.,Associate Professor King Saud University, College of Science, Department of Statistics and Operations Research, 1998 -Assistant Professor, King Saud University, College of Science, Department of Statistics and Operations Research, From 1983 to 1998- Demonstrator in Mathematic Department in Damascus University 1979.

Professional Experience: He has more than 27 years academic teaching experience in Operations Research, Statistics, and Mathematics, supervising several M.Sc. and PhD thesis., Main contributor in the design and development of the B.Sc. and M.Sc. and PhD Programs in Operations Research And Statistics in the Department of Statistics and Operations Research in King Saud University.(Riyadh - Saudi Arabia), Member in the editorial board of "Journal of Scientific Inquiry" , Acting as a referee for more than 20 specialized and leading international journals (more than 20 papers per year) . He contributed in many Local and International Scientific Conferences and Symposiums ,Plenary Speaker in the 3rd International Conference on COMPUTATIONAL INTELEGENGE(CI09)-Iv.Javakhishvili Tbilisi State University - Georgia .He is also invited as Plenary Speaker in AMERICAN CONFERENCE ON APPLIED MATHEMATICS (AMERICAN-MATH '10)University of Harvard, Cambridge, USA, January 27-29, 2010

He contributed in giving consultations in solving local real problems in Saudi Arabia using the OR techniques.

His Research Interests: are in Applied Mathematic (Operations Research Oriented). In particular, Optimal Search problems where he has more than 10 research papers. Recently his research turns to Inventory Control problems with more than 35 publications in scientific and leading journals. He also authored 4 books in Fundamentals of Operations Research, Inventory Control, Game Theory, and Integer Programming.

He is Syrian , and he is establishing a private University in Syria, but he in now working is Saudi Arabia.

Plenary Lecture 4

Over the Evolution of the Fundamental Ideas of Fracture Mechanics



Professor Razvan Raducanu

Al. I. Cuza University

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Abstract: I will present the most important theories of fracture mechanics and their evolution in time. This evolution will be described from an historical point of view following three major directions: experimental methods, numerical methods and analytical methods. I will start from the observation of Leonardo da Vinci from the fifteenth century and go until the present time, pointing out the most important moments and ideas in the evolution of fracture mechanics.

Brief Biography of the Speaker:

Raducanu Razvan was born in Iasi, Romania on the 16th of March 1975. He received a bachelor degree in Mathematics at the "Al. I. Cuza" University from Iasi, Romania in 1997. In 2000 Razvan received the MSc title in Applied Mathematics from the university "Al. I. Cuza" from Iasi. In 2002 he receives the PhD title from the "Bucuresti" University on the field of computational mechanics. Presently Razvan teaches courses on Web programming, database security, financial mathematics and PR online at the "Al. I. Cuza" University. He is chairman of the WSEAS Romanian Chapter on Applied Mathematics.

He is a professor at the Dept of mathematics of the "Al. I. Cuza" University from Iasi, Romania. He published more than seven books on computational mechanics, windows programming, XML, etc. He also published more than 40 research papers indexed in all major databases (ISI Thompson, MathSciNet, Zentralblatt MATH, etc.).

Prof. Razvan Raducanu He is member of the following professional associations: SIAM,, member of the Romanian Association of Fracture Mechanics, member of the Romanian Society of Applied and Industrial Mathematics, member of the American Mathematical Society, member of IAENG, etc.

Plenary Lecture 5

Nanotechnology Reductionism and Global Sustainability



Professor Armando Barranon

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Abstract: Nanotechnology Patents are concentrated in the industrial leader countries leading to a Nanodivide that will increase Regional Underdevelopment and will maintain a scarce demand of new products. Societal effects need to be taken on account to ensure the availability of nanoproducts related to welfare. Reductionist approaches to Nanotechnology ignore the possible effects of Nanotechnology products on Environment and a lack of regulation has allowed massive distribution of products that will incorporate nanoparticles in residual waters without sound studies of the interaction of these particles with the environment. Fluorocarbons have already destroyed part of the ozone layer and there is no reason why these residual nanoparticles will be harmless to biosphere. Developing countries such as Mexico are having troubles in setting up a Nanotechnology National Initiative due to low investment in technological research, few coordination of the nanotechnology networks and the tendency to concentrate all the investment in a few rich localities. Individual countries cannot compete with aggregates of countries like the European Union or the assembly of States like USA. Nowadays several regions of the world are away of the industrialization process with severe consequences for their population welfare. Therefore a comprehensive perspective is needed to attain a sustainable development of nanotechnology that incorporates more countries to the Nanotechnology Revolution expected for the following years. A cosmopolitan viewpoint is needed that ensures the access of the global population to the benefits of nanotechnology in strategic areas such as energy, health and food. Hence, the original approach to Nanotechnology considering it only in terms of size has rapidly evolved in few years into a comprehensive and sustainable standpoint that will help us to overcome the difficulties of this Technological Revolution. Nanotechnology Globalization can lead us to the development of a cosmopolitan citizenship as desired by Kant that might help is to build up a better world via this technological revolution.

Brief Biography of the Speaker:

Armando Barranon was born in Mexico City. B.Sc. in Mathematical Physics, Instituto Politecnico Nacional, Mexico City, 1986.

M.Sc. in Applied Statistics, The University of Texas at El Paso, 1989. Dr. in Philosophy, U. La Salle, Magna Cum Laude, Mexico City, 2004. M.Sc. Physics, Instituto Politecnico Nacional, Mexico City, 2005. Dr. in Physics of Materials, Instituto Politecnico Nacional, Mexico City, 2008.

Postdoctoral Fellow, U. Zacatecas, Mexico, 2008. Postdoctoral Fellow, U. of Texas at El Paso, 2009. Postdoctoral Fellow, CINVESTAV, 2009.

He is Full Professor at Department of Basic Sciences, Universidad Autonoma Metropolitana-Azacapotzalco, Mexico City. Research interests include Nuclear Physics, Computational Physics and Philosophy of Technology. In 2007, Dr. Barranon founded the Nanoeducation Seminar at UAM-Azacapotzalco.

Dr. Barranon is member of the Mexican National Research System, Scientific Projects Evaluator of the Mexican Council of Science and Technology, member of American Physical Society, Sociedad Mexicana de Fisica, Sociedad Mexicana de Matematicas, Sociedad Mexicana de Termodinamica, Sociedad Mexicana de Historia de la Ciencia y la Tecnologia, among others.

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