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MATHEMATICS AND COMPUTERS IN BUSINESS AND ECONOMICS

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Proceedings of the 9th WSEAS International Conference on MATHEMATICS and COMPUTERS IN BUSINESS AND ECONOMICS (MCBE '08)

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Preface

This book contains the proceedings of the 9th WSEAS International Conference on MATHEMATICS & COMPUTERS IN BUSINESS AND ECONOMICS (MCBE '08) which was held in Bucharest, Romania, June 24-26, 2008. This conference aims to disseminate the latest research and applications in Mathematical Methods, Computational Techniques, Statistical Methods, Simulation, Mathematical or Computer Analysis of Experimental Methods, Business Management, Financial Management, Financial Accounting, Production and Operations Management, Project Management, Marketing, Electronic Commerce, Regional Economics, Health Economics, Agriculture Economics and other relevant topics and applications.

The friendliness and openness of the WSEAS conferences, adds to their ability to grow by constantly attracting young researchers. The WSEAS Conferences attract a large number of well-established and leading researchers in various areas of Science and Engineering as you can see from **http://www.wseas.org/reports**. Your feedback encourages the society to go ahead as you can see in **http://www.worldses.org/feedback.htm**

The contents of this Book are also published in the CD-ROM Proceedings of the Conference. Both will be sent to the WSEAS collaborating indices after the conference: **www.worldses.org/indexes**

In addition, papers of this book are permanently available to all the scientific community via the WSEAS E-Library.

Expanded and enhanced versions of papers published in this conference proceedings are also going to be considered for possible publication in one of the WSEAS journals that participate in the major International Scientific Indices (Elsevier, Scopus, EI, ACM, Compendex, INSPEC, CSA .... see: www.worldses.org/indexes) these papers must be of high-quality (break-through work) and a new round of a very strict review will follow. (No additional fee will be required for the publication of the extended version in a journal). WSEAS has also collaboration with several other international publishers and all these excellent papers of this volume could be further improved, could be extended and could be enhanced for possible additional evaluation in one of the editions of these international publishers.

Finally, we cordially thank all the people of WSEAS for their efforts to maintain the high scientific level of conferences, proceedings and journals.

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Plenary Lecture I

Electrical Energy: State of Art, Needs and Prospects

Prof. Abdellatif Miraoui,
Head of the Department of GESC (Génie Electrique et Systèmes de Commande)
Electrical Engineering and Control Systems

Abstract: Due to the worrying global warming, the humankind has to change its habits and several important political choices have to be taken in order to avoid irreversible damages on the biodiversity and on the human life conditions. To face up this situation the carbon dioxide emission has to be reduced, and the development of renewable energy sources is one of the solutions. First, this paper looks over the current contribution of renewable to the global energy consumption. Then, the weak impact of renewables is explained by giving details on each renewable energy and nuclear energy is also studied. Finally, the future potential of nuclear energy and renewable is analysed.

Plenary Lecture II
On Human Adaptive Mechtronics

Professor Hongnian Yu
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Abstract: Human adaptive mechatronics is intelligent electrical-mechanical systems that are able to adapt themselves to the human's skill in various environments and providing assistance in improving the skill, and overall operation of the combined human machine system to achieve the improved performance. It is clear that humans have strong and extremely adaptive natural mechanisms that are able to accommodate external environmental disturbances under which internal life cycle operations can still be regulated very effectively. It has been a significant attraction for human beings to apply similar biologically inspired mechanisms to man-made systems such as mechatronically built robots, unmanned air vehicles, airplanes, auto pilot steering systems, engineering ergonomics, and enormous examples encountered in autonomous systems. It aims to study automata from an engineering perspective and to serve the purpose of controlling advanced engineering systems. The improvement in human-machine interfaces has made advanced intelligent machines possible without special education and training. This talk will introduce the basic concepts of human adaptive mechtronics and the current projects conducted by the members from a recent EPSRC funded network on human adaptive mechatronics.

Brief Biography of the Speaker: Prof Hongnian Yu has held academic positions at the Universities of Yanshan, Sussex, Liverpool John Moor, Exeter, Bradford and Staffordshire. He is currently Professor of Computer Science and the head of the Mobile Computing and Distributed control Systems Research Group (http://www.EPSRCHAM.org.uk/MCDS/)) at Staffordshire University. He has extensive research experience in modelling and control of robots and mechatronics devices, and neural networks, mobile computing, modelling, scheduling, planning, and simulations of large discrete event dynamic systems with applications to manufacturing systems, supply chains, transportation networks and computer networks. He has published over 140 journal and conference research papers. He has held several research grants from EPSRC, the Royal Society, and the EU, AWM, as well as from industry. He is leading an EPSRC funded international joint research project: UK-Japan Network on Human Adaptive Mechatronics (EPSRC) www.EPSRCHAM.org.uk. He is a member of EPSRC Peer Review College. He is a Program Co-chair of UKACC 2008 (http://www.control2008.org/), a Program Chair of IEEE Conference on Networking, Sensing and Control in 2007 (http://www.ieee-icnsc07.org/), a General Chair of International conference on Software Knowledge Information Management and Applications in 2006 (http://www.camt.info/skima2006/), and is serving on various other conferences and academic societies. He was awarded the F.C. William Premium for his paper on adaptive and robust control of robot manipulators by the IEE Council in 1997.

Plenary Lecture III
Non-linear implications in seismic isolation systems for buildings

Professor Dinu Bratosin
Member of the Technical Sciences Academy from Romania (ASTR),
Scientific secretary,
Department of Technical Sciences of the Romanian Academy,
Romanian Academy,
Institute of Solid Mechanics,
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Abstract: By interposing a properly chosen flexible layer between superstructure and his foundation the base-isolation technology can shift the natural period of structure away from the dominant period of earthquake ground motion and thus avoid the destructive effects given by the system resonance.
As a result of flexibilization the natural period of the past fixed-base structure undergoes a jump towards the longer new natural period. Certainly, this "period-shift" depends on non-linear strength and damping characteristics of the materials or devices from this isolation layer. In addition, all the site soils materials has the well-known non-linear mechanical characteristics which affects the dynamic structural response. Thus, in the period-shift evaluation the non-linear behaviour of both isolator and site layers must take into account. Two is the main objectives of this paper. First is to present a method for necessary period-shift determination using the dynamic magnification functions. Then, using a non-linear one-degree-of-freedom model for superstructure-base system by numerical simulation one present the effects of the soils and isolator layer non-linearity on shape and resonant magnitude of the magnification functions. In terms of non-linearity kind – hardening or softening – can arise the different period-shift modifications. Thus, the isolator layer which can have both type of non-linearity lead to shortening shift in case of the hardening non-linearity or can lead to the increasing shift if the isolatory materials or devices has softening behaviour. Also, the site degradable materials have softening non-linearity, therefore in this case can arise only increasing period-shift. Neglecting these period-shift variations due to non-linear effects by using linear assessment of necessary period of the base-isolation structure the main purpose of the base-isolation technology – the drawing out of structure from dangerous resonant zone - can be compromise.

Brief Biography of the Speaker: Dinu BRATOSIN graduated the Faculty of Structural Engineering (Bucharest Civil Engineering Institute, 1971) and has a Ph.D. in Technical Sciences (Mathematical methods in solid mechanics, National Center of Physics, 1984). His research activities focused on solid mechanics, soil mechanics, soil dynamics, earthquake engineering. He is the author or co-author of more then 50 published papers, 4 books, 3 book chapters and more then 60 research projects in these fields. He received in 1996 Anghel Saligny award of the Romanian Academy for group of papers: Dynamic viscoelastic nonlinear model for soils.

Plenary Lecture IV
Tele-AUCTION, a service for SMEs' acquisitions

Prof. Cornel I. G. Resteanu
Head of Institutional Research Department,
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Abstract: In many European countries, the laws in force are stipulating that goods and services acquisitions as well works contracting using public funds must be made in the auction regime. Public administration, national companies, the enterprises or institutions that benefit from public funds for investments, must use this electronic instrument as a tool in their procurement activity. Even private companies, which are always functioning on the maximization profit principle, are also invited to use this software for good quality products and services acquisition at lowest prices. Tele-AUCTION addresses all these categories of potential beneficiaries. It can be used for the acquisition of great value goods and services that are especially specific for the investments' activity achievement. Tele-AUCTION has two functional blocks. The first block addresses the Investments Department and, as a consequence, works on the Intranet. The second block addresses the potential goods and services suppliers and, as a consequence, works on the Internet. In the following there are presented the steps flow for an electronic auction using this software. The function named "Investments objectives" creates, modifies and deletes records containing investments' objectives. The people from the Investments Department can deal with the following fields: OBJECTIVE NAME, OBJECTIVE CODE, PLANNED VALUE, FINANCING and AUCTION DEADLINE. There are also three read-only fields: CURRENT VALUE, ANOUNCEMENT and AUCTION STATUS associated to the investments objective. In order to accomplish an investments objective, one can make acquisitions of goods and services that can be grouped in objects classes. The most important element in auction progress is to define its basic elements, namely to define objects classes. The function named "Objects classes" creates, modifies and deletes records containing objects classes for a given investments objective. First one chooses an investments objective. So, it is possible to access objects classes pending on current investments objective. The people from the Investments Department can deal with the following fields: OBJECTS CLASS CODE, OBJECTS CLASS NAME, MEASURE UNIT, PLANNED PRICE, PLANNED QUANTITY, PLANNED VALUE and AUCTION DEADLINE for the current objects class. There are also six read-only fields: CURRENT PRICE, CURRENT QUANTITY, CURRENT VALUE, ANOUNCEMENT, REFERENCE OBJECTIVE DEADLINE and AUCTION STATUS associated to the objects class; the last two items are correlated with AUCTION DEADLINE. The function named "Objects classes attributes" creates, modifies and deletes lines in tables containing attributes for a given class of objects included in investments' objective. It also offers the possibility to visualize all current values of attributes for each object belonging to the competing companies. In order to define objects classes attributes, first one accesses a class of objects. One fills-in the following fields: ATTRIBUTE NAME, MEASURE UNIT, MAX / MIN, LOWER LIMIT, UPPER LIMIT and WEIGHT. The attribute PRICE automatically appears at the top of the table, being always the first attribute. So, every class of objects has at least one attribute, the implicit one. It is also possible to visualize the attributes current values for every object proposed by the potential suppliers. As a conclusion, at this step end, the information ensemble necessary to begin an auction is available. It is possible to access the e-auction site using Microsoft Internet Explorer or Netscape browsers. The potential suppliers must register in the system and so, they become auction competitors. The procedure is very simple. Investments' objectives, objects to buy with their required quantities and attributes are shown by Tele-AUCTION in a friendly manner. The competitors must fill-in: OBJECT NAME, QUANTITY and all OBJECT ATTRIBUTES. They must pay a great attention in their objects description. Every attribute must be specified with accuracy because a mathematical model, for competitors

dynamic ranking, will be constructed from the information available in the site database. During the auction, for a fixed object, the system gives information about its attributes in comparison with the attributes of the first three ranked objects, other than the fixed object. So, a competitor can improve the object attributes, hopping that his object increases its competitiveness. There are allowed only five sessions with attributes updating, but the quantity and the price are free to unlimited re-biddings. During the auction, in the case that the auction organizer establishes new limits for the objects class attributes, some object attributes can become out of limits and, in order to stay in competition, the attributes must be updated. When the auction status becomes "closed" no more updates are possible. For the bidden object, its final competition characteristics are done. The competitor must wait for the auction result which appears when the auction status becomes "decided". During three days, the period that is allowed for "closed" status, the people from Investments Department can intervene in the automatic given results in order to make some corrections. The function named "Objects ranking and auction decision" shows the objects ranking and gives the possibility to make auction human decision. For a pair of investments objective - objects class are presented: PLANNED VALUE, CURRENT VALUE, AUCTION DEADLINE, AUCTION STATUS and BIDDEN QUANTITY. All above information is available at any moment of auction progress, whatever is the auction status: OPEN / CLOSED / DECIDED. In a table containing: OBJECT NAME, COMPANY, MERIT, PRICE, QUANTITY, VALUE and ORDERED QUANTITY, the current / final objects' ranking is given. With one exception, all the fields in the window are read-only. Only when the auction status is CLOSED, the ORDERED QUANTITY column is set free to end-user intervention. So, it is possible to ignore automatic auction decision and make a human one. When the auction status is "decided" the competitors are informed about final auction results. The participants' panoramic view is given. The winner or winners are automatically invited to sign the economical contracts. So, the suppliers can trust than they compete in an environment characterized by loyalty and transparence. The strong point of Tele-AUCTION software is the fact that the competitors ranking is automatically made using a mathematical model belonging to the multi-attribute decision making class. The facility to make human correction shows flexibility in front of problem complexity.

Brief Biography of the Speaker: Cornel I. G. Resteanu is the head of Institutional Research Department at the National Institute for Research and Development in Informatics, Bucharest, Romania. Also, he had been an associate professor at the AISTEDA Bucharest University - Department of Informatics (1995-1997). He has published 5 books and over 60 papers in conference proceedings or journals. His research activities include studies in Operations Research (mathematical programming, multiple attribute decision making, graphs, transport, stocks etc.), Artificial Intelligence, Euristics, Cybernetics, Economics, Manufacturing, Production Control, Large-Scale Systems Simulation / Optimization / Control, Reliability, Advanced Decision Support Systems, E-commerce, E-procurement, E-business, E-learning. He is also an expert of analysis and mathematical modeling in complex information systems; Consultancy on simulation / optimization / control problems with application to industrial units; Design of information systems meant for: coal mining, machine-building, electronics, construction materials, leather, ready-made clothes, petrochemical etc. industries; Informatics audit, enterprise evaluation and management consultancy (together with ERNST & Young).

Plenary Lecture V
Algorithms used to obtain aggregated value sets from relational databases

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Abstract: For n fields used for grouping we can obtain 2^n aggregation types. When n is not small, 2^n is a considerable value. With a new model for the specification of aggregation types, we present ways in which we can obtain any subsets of aggregation types, starting from n fields used for grouping. The algorithms concern cases in which: The specification of aggregation types is made after we insert the data in the tables; The specification of aggregation types is made before we insert the data in the tables. In order to obtain the results really fast, we also use hypercubes; - The case of one table (the fields used for grouping and for aggregation are from the same table) where we use one hypercube and we can specify the aggregation types in any moment (after or before the data insertion in the table) - model which can be used for questionnaires. These algorithms can be used in many economic analyses, in order to obtain complex reports. We will also present an example which concerns the sales in a supermarket chain. In our study we have worked with databases from *Access* and we have made the algorithm implementation in *Delphi*, but the implementation can also be made in other programming environments and we can also use other relational databases.

Brief Biography of the Speaker: Mirela-Catrinel Voicu was born in Romania, in 1972. In 1995, she graduated from the Faculty of Mathematics and Computer Sciences, West University of Timisoara. She received the MSc degree in Applied Mathematics, Informatics in Economy and Computer Sciences from the West University of Timisoara. She followed a training course for PhD thesis at the National Institute for Statistics and Economic Studies, Paris, France. She received her PhD in 2001 from the University of Timisoara, Romania (with the "Cum laude" distinction) and from the University of Paris 13, France (with the "Très honorable avec félicitations" distinction). Currently she is Professor of the Department of Economic Informatics, within the Faculty of Economic Sciences, West University of Timisoara, Romania, where, since 1995, she has held several academic positions. Her activity includes Programming and Internet Programming, Informatics in Economy, Databases, OOP, Data structures. Through the collaboration program between the Faculty of Economic Sciences and the Faculty of Mathematics and Informatics of the West University, she has held classes with international participation, in postgraduate education, in the section of "Mathematic Modeling in economics and applied sciences" – Exchange Rate Evolution Models – subject introduced within the program due to the original contributions in she's PhD. During the collaboration between the Faculty of Economic Sciences, West University of Timisoara and CUOA – Italy, she has taught in postgraduate university, "The Management of Business and Public Administration", the subject, Internet. She has 60 papers in conference proceedings or refereed journals (from these papers, 12 have been presented or published abroad). She has published 7 books (1 book in France and 6 books in Romania). She is a reviewer and a member in international program committee of 6 WSEAS conferences from abroad, member in the teams of 9 research projects (one of which is international) and project manager for one research project. Since 2002, she is a member of INFOREC (Romanian Association for Economic Informatics Training Promotion) and since 2005 is a member of WSEAS (World Scientific And Engineering Academy And Society).

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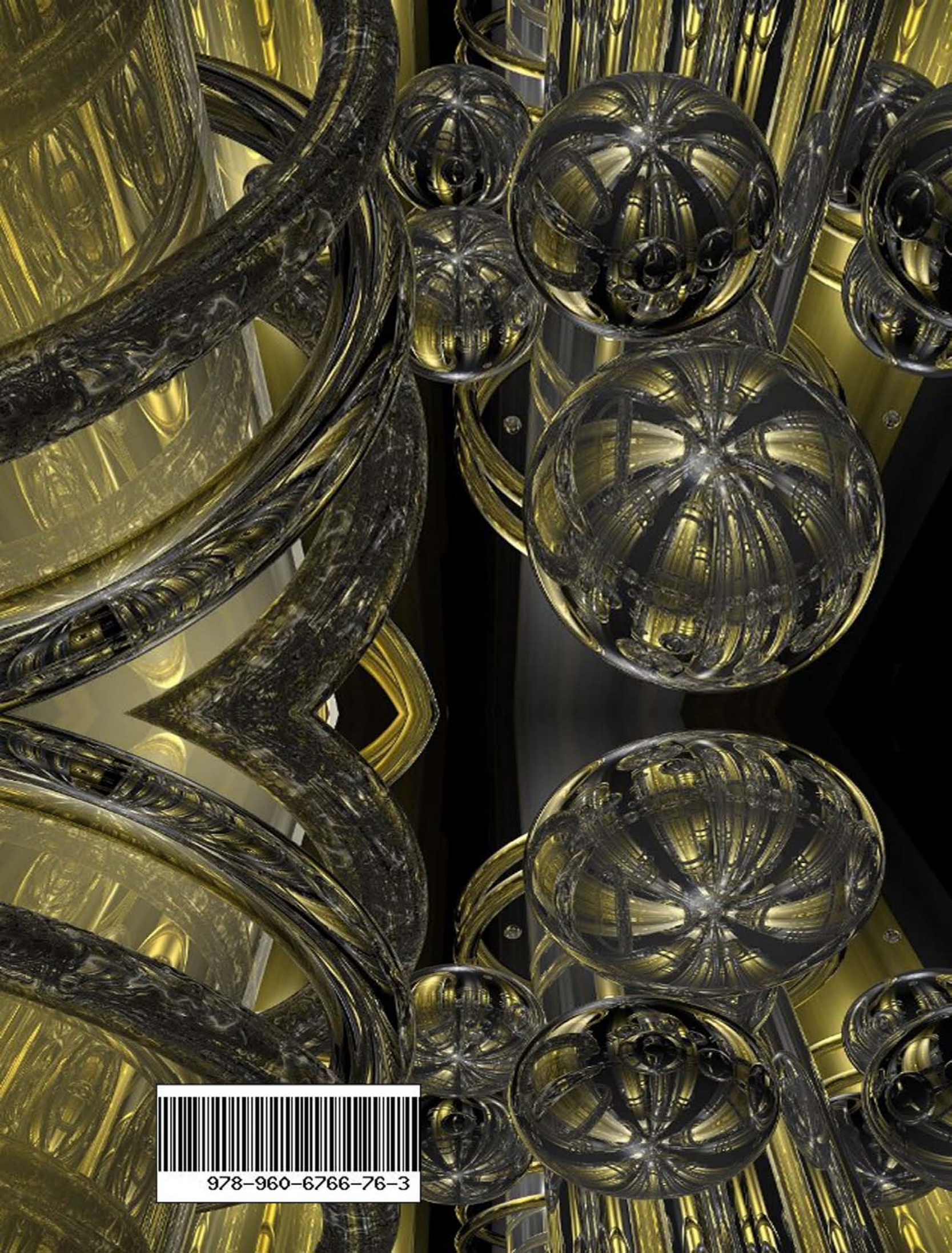

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