

Editors: Prof. Alexander Grebennikov, Ciudad Universitaria, Mexico
and Prof. Alexander Zemliak, Puebla Autonomous University, Mexico

MODERN TOPICS of COMPUTER SCIENCE

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Proceedings of the 2nd WSEAS International Conference on
COMPUTER ENGINEERING and APPLICATIONS
(CEA '08)

Acapulco, Mexico, January 25-27, 2008

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Ciudad Universitaria
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Puebla Autonomous University
Mexico.

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Preface

This book contains proceedings of the 2nd WSEAS International Conference on COMPUTER ENGINEERING and APPLICATIONS (CEA'08) which was held in Acapulco, Mexico, January 25-27, 2008. The first WSEAS COMPUTER ENGINEERING and APPLICATIONS Conference was held in Gold Coast, Queensland, Australia, January 2007 and this year in Acapulco, Mexico. The Society (WSEAS) has also organized many other separate or joint conferences on Theoretical and Applied Computer Science, i.e. Algorithms, Computing Theory, Graphs, Computational Geometry, Numerical Analysis, Software Engineering, Data Bases, Knowledge Engineering, Networking, Telecommunication Systems, Multimedia, Internet, Video Systems, Hardware Engineering, Man-Machine Systems, Cybernetics, Computational Intelligence etc as well as their impact and their interaction with other areas of Electrical Engineering and Computer Science and Engineering. The relevant titles could be retrieved from the web site: www.worldses.org/history.htm

The 2nd WSEAS International Conference on COMPUTER ENGINEERING and APPLICATIONS (CEA'08) aims to disseminate the latest research and applications in the afore mentioned fields. 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 these 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, 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).

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

The Editors

Plenary Lecture I

Some Aspects of Minimal-Time Electronic Networks Design Methodology



Professor Alexander Zemliak
Department of Physics and Mathematics
Puebla Autonomous University
Av. San Claudio y Rio Verde, Puebla, 72570
MEXICO

Abstract: The size and the complexity of the systems grow constantly. One of the main problems of a large system design is the excessive computer time that is necessary to achieve the final point of the design process. There are some powerful methods that reduce necessary time for network analysis. The progress in optimization technique favors the development of fast algorithms for electronic networks design too. Nevertheless, the time of a large-scale circuit analysis and the time of any optimization procedure increase when the network scale increases. Meanwhile, it is possible to reformulate the total network design problem to generalize design process. The general design methodology was formulated on basis of the optimal control theory approach that includes a special control vector. The problem of time-optimal network design strategy is formulated as the typical problem for some functional minimization of the control theory. The design process in this case is formulated as the controllable dynamic system. The behavior of the Lyapunov function of this dynamic system and the properties of its time derivative have sufficient information to select more perspective design strategies from infinite set of the different design strategies. The special function can be proposed to predict a structure of the time optimal design strategy. This function is a key to construct the optimal behavior of the control vector. The solution of this problem gives possibility to construct the minimal-time system design algorithm.

Brief Biography of the Speaker: Alexander M. Zemliak received the M.S. and Ph.D. degrees from the Kiev Polytechnic Institute (KPI), Kiev, Ukraine, in 1972 and 1976, respectively, all in electronic engineering. From 1972 to 1976, he was a Researcher with the Department of Radioelectronic Systems, KPI. From 1976 to 1994, he worked as a Professor at KPI. From 1994 he works as a Professor at Puebla Autonomous University, Department of Physics and Mathematics, Puebla, Mexico. He is a Senior Member of IEEE and Member of New York Academy of Sciences. He was chairman of some sections of international conferences on ISCAS IEEE Thailand, IEICE Tokyo, Japan and others. He was the General Chairman of the WSEAS International Multi Conference: 2002, 2004, 2005, Cancun, Mexico. He is the Editor in Chief of WSEAS Transactions on Systems and member of the Editorial Board of the WSEAS Transactions on Circuits and Systems and WSEAS Transactions on Electronics. He was invited as Plenary Lecturer for 16 International Conferences. His research interests are in computer-aided RF and microwave circuit analysis, optimal design methodologies, computational electromagnetics, numerical techniques in the simulation, analysis and optimization of microwave devices. He has authored of 6 textbooks for students and over 200 papers in refereed journals and conference proceedings on topic related to RF and microwave analysis, optimization and design methodology.

Plenary Lecture II

Nonlinear Control and Synchronization of Multistable Dynamical Systems



Professor Alexander Pisarchik
Centro de Investigaciones en Optica, A.C.
Mexico.

Abstract: Nonlinear dynamical systems are known to exhibit a rich variety of different long-term behaviors such as stationary points, limit cycles, quasiperiodic, and chaotic motion. In a complex system several equilibrium states (attractors) may coexist for a given set of system parameters. Chaos and multistability are the most excited phenomena in nonlinear dynamics. Multistability has been found in almost all research areas in natural science, such as mechanics, optics, electronics, environmental science and neuroscience. Multistability also appears in systems subject to time-delayed feedback and in coupled systems. Due to complexly interwoven basins of attraction, multistable systems are extremely sensitive to noise, parameter perturbations or small changes in initial conditions. This can create inconvenience in many practical situations; for instance, when one desires to design a commercial device with predetermined characteristics. Therefore, control of multistability is an important problem in applied nonlinear science and engineering. The significant progress in controlling nonlinear dynamics and chaos encourages the creation of methods for controlling multistability. Synchronization of multistable systems is another long-standing and challenging problem of a broad interdisciplinary interest, both from the point of view of fundamental research and for practical applications including secure communication. This talk is devoted to new achievements in resolving these two important problems on examples of different dynamical systems, from iterative maps to differential equations and experiments with electronic circuits and lasers.

Brief Biography of the Speaker: Alexander N. Pisarchik graduated from Physics Department of the Belarus State University in Minsk in 1976 and carried out doctoral research in Optics and Quantum Electronics at the Institute of Physics of the Belarus Academy of Sciences where in 1990 he obtained the Ph.D. in Physics and Mathematics. In 1997 he completed the special courses on Nonlinear Dynamics in Physiology and Medicine at the McGill University, Montreal, Canada and Time Evolution of Complex Systems in Lisbon, Portugal. In 1983-88 he was the Assistant Director of the Molecular Kinetics Laboratory in the Institute of Physics, and in 1989-92 he was the Vice-Director of the same laboratory. He was awarded by several research grants from governments and universities of different countries and worked as a Researcher at Universite Libre de Bruxelles in 1992, Universitat Autònoma de Barcelona in 1993-99 and 2006-7 and University of Iceland in 1995. Since 1999 he works as a Research Professor at the Center of Optical Research in Leon, Guanajuato, Mexico. Prof. Pisarchik is the member of the National System of Researchers (SNI, level III), Society for Industrial and Applied Mathematics, American Association for the Advancement of Science, National System of Evaluators in Science and Technology, Mexican Physical Society and Academy of Optics. He has received various recognitions, including the First Prize of the National Academy of Sciences of Belarus for his studies of Nonlinear Dynamics in Complex Systems (1999). He was the organizer and Chair of the International Conference on Control and Synchronization of Dynamical Systems which was held in Leon, Mexico in 2005.

His main research interests include the chaos theory and applications to lasers and other dynamical systems, control and synchronization, multistability, chaotic cryptography for secure communication. He is the author of more than 200 scientific publications and 4 patents and presented 36 invited lectures, the Guest Editor of the Proceedings of the 6th WSEAS Conference (2002), the International Conference on Control and Synchronization of Dynamical Systems published in Journal of Physics: Conference Series (2005), and the theme issue on Multistability in Dynamical Systems assigned for publication in International Journal of Bifurcation and Chaos in 2008. He is the Editorial Board Member of The Open Electrical and Electronic Engineering Journal and the Editor of the book Recent Advances in Laser Dynamics: Control and Synchronization which will be published by Research Singpost in 2008

Plenary Lecture III

Language Constrained Graph Problems - A Microcosm of Engineering Research and Development

Professor Phillip G. Bradford
Department of Computer Science
The University of Alabama, USA
Box 870290
Tuscaloosa, AL 35487-0290
USA

Abstract: Neither research nor development are islands. This paper attempts to give a broad perspective to research and development from their intellectual foundations to their place in modern business and entrepreneurship. It serves as a high-level sketch rather than a comprehensive discussion. This paper culminates in a very brief view of labeled path problems. This is done while mentioning a number of diverse applications. Labeled path problems demonstrate our review of some concepts and insights about research and development. We also briefly discuss their place in building our intellectual infrastructure as well as their potential contributions to modern business and entrepreneurship.

Plenary Lecture IV

A survey of playout delay algorithms for interactive applications on the Internet



Professor Victor Ramos R.
Head of the Electrical Engineering Department
Metropolitan Autonomous University (UAM)
San Rafael Atlixco 186, Col. Vicentina,
09340 Mexico City, Mexico
E-Mail: vicman@xanum.uam.mx

Abstract: Interactive audio applications are now widely used in the Internet. Such applications require receiver playout buffers to smooth network delay variations and to reconstruct the periodic form of the transmitted packets. Packets arriving after their playout deadline are considered late and are not played out. We will explore in this talk three classes of playout delay control algorithms that are used in the Internet. The first class of algorithms sets a fixed deadline for all the arriving packets at the receiver. The second class of algorithms, proposed originally by Henning Schulzrinne and later by Ramachandran Ramjee, operate by adaptively adjusting the playout delay from talkspurt to talkspurt. Finally, the third class of algorithms adjusts the playout delay of each packet on the fly by using a technique called WSOLA. This latter class of algorithms allows to play out packets almost as they arrive with little distortion which is not perceived by the human ear. This mechanism allows to reduce the average playout delay as well as the loss rate due to late packets during an audio session. In this talk, we will compare the three different classes of playout algorithms cited above. We conclude by discussing current research directions on this topic.

Short Biography of the Speaker: Victor Ramos received the DEA degree (the french equivalent of the master degree) in Networks and Distributed Systems and the PhD degree in Computer Science, both from the University of Nice-Sophia Antipolis, France, in 2000 and 2004 respectively. From 2000 to 2003, he was assistant professor at Institut Eurecom, IAAI Marseille and UNSA in France. Since 1995, he is professor at the Metropolitan Autonomous University (UAM), in Mexico. At UAM, Prof. Ramos has been the Head of the Networks and Telecommunications Research Team, from 2005 to 2007, and since march 2007, he is the Head of the Electrical Engineering Department. Prof. Ramos has been reviewer for several international conferences and journals like IEEE Infocom, IEEE Globecom, Sigmetrics, Transactions on Networking, Journal on Selected Areas in Communications, Computer Networks, IEEE Transactions on Wireless Communications. He has also been part of the TPC of IEEE Globecom, ICEEE and VCM. Victor Ramos is the author of research papers published at IEEE Infocom, QEST, IWQoS, QofIS and ICEIS. The main research interests of Prof. Ramos are in Performance Evaluation of Computer Protocols, Pricing on the Internet and Peer-to-Peer Networks.

Plenary Lecture V

General Ray Method and Computer Program Package for Explicit Solution of Boundary Value Problems for Elliptic Partial Differential Equations in Domains with Complicated Geometry.



Professor Alexander Grebennikov
Faculty of Physical and Mathematical Sciences
Autonomous University of Puebla
Av. San Claudio y Río verde, Ciudad Universitaria,
CP 72570, Puebla
MÉXICO
E-Mail: agrebe@cfm.buap.mx

Abstract: A new version of General Ray (GR) method for solution of the Dirichlet boundary value problem for the class of elliptic Partial Differential Equations (PDE) is proposed. This version is based on application of the Radon transform directly to the PDE and consists in reduction PDE to assemblage of ODE. The class of the PDE includes the Laplace, Poisson and Helmgoltz equations. GR-method presents the solution of the Dirichlet boundary value problem for this type of equations by explicit analytical formulas that use the direct and inverse Radon transform. Proposed version of GR-method is justified theoretically, realized by fast algorithms and MATLAB software, which quality is demonstrated by numerical experiments.

Short Biography of the Speaker: Grebennikov Alexander Ivanovich was born at 17 of April 1950 in Gorky city, Russia. The student of the Faculty of Calculating Mathematics and Cybernetics (FCMC) of Gorky State University at 1967-1972. Postgraduate student of the FCMC of Moscow State University (MSU) at 1972-1975. Was graduated PhD in 1976. Scientific interests: splines; data processing; inverse and ill-posed problems; fast algorithms in numerical analysis and applications. Publications: more than 120 articles in journals and proceedings, 2 texts of lectures, 5 monographs. Work: assistant professor of the FCMC MSU at 1976-1989; senior staff scientist of Scientific Research Computing Center (SRCC) MSU at 1989-1994; Head of Laboratory in SRCC MSU at 1995-1999; full professor of the Faculty of Physic and Mathematic Sciences of Autonomous University of Puebla, Mexico from 1999 to present day. Adres: Av. San Claudio y Río verde, Ciudad Universitaria, FCFM, CP 72570, Puebla, tel./fax (52 222) 8920073, e-mail: agrebe@cfm.buap.mx

Table of Content

Part I: Computer Engineering

Measurement repository for Scrum-based software development process Viljan Mahnic, Natasa Zabkar	23
NiCd battery type parameter estimation using a hybrid neuronal approach L. Merad, M. Bekhti, N. Larbi, A. Boutte	29
Experiences of Implementing a Value-Based Approach to Software Process and Product Assessment Pasi Ojala	34
Content-based image retrieval using wavelets L. Flores-Pulido, O. Starostenko, D. Flores-Quéchol, J. I. Rodrigues-Flores, Ingrid Kirschning, J.A. Chávez-Aragón	40
Memory Management :Tertiary Buddy System Divakar Yadav, Arun Kr Chaturvedi, Snehil Pansari, Avart Krishnan	46
t-Frame: the Design of a Multiuser Interactive Wall Alessandro Soro, Gavino Paddeu	50
Towards a Value-Based Approach In Software Engineering Pasi Ojala	54
Strategic planning for the Computer science Security of Banking Organizations, Companies and Government Jorge Alberto Ruiz-Vanoye, Juan Carlos Olivares-Rojas, Ocotlan Diaz-Parra, Jorge Omar Ceyca Castro, Alejandro Fuentes-Penna	60
Proposal for multicast transmissions in NC-HMIPv6 environment Tanon Lambert Kadjo , Souleymane Oumtanaga, Tiémoman Koné, Pierre Tety	65
Language Constrained Graph Problems: A Microcosm of Engineering Research and Development Philip Bradfor	71

Part II: Computer Engineering Applications

A Robust Face Detection Method Using Probability Maps Miki Matsumoto, Osamu Uchida, Shohachiro Nakanishi	79
Adaptive Testing System Modeled Through Fuzzy Logic J. Suarez-Cansino and R. A. Hernandez-Gomez	85

Optimal determination of partial transmission ratios of three-step helical gearboxes with second-step double gear-sets for minimal gearbox length Vu Ngoc Pi	90
Image authentication and recovery scheme based on watermarking technique Kenji Sumitomo, Mariko Nakano, Hector Perez	94
Design of information distribution system for cellular phones based on preferences and movement records of user Kazuya Tomizawa, Osamu Uchida	100
Spinodal Decomposition and Isospin in Heavy Ion Collisions Armando Barrañón, Jorge Alberto López Gallardo	106
Numerical Study of Controlling Multistability by Periodic Pump Modulation in an Erbium-Doped Fiber Laser Rider Jaimes-Reátegui, Alexander N. Pisarchik, J. H. García-López	110
Elements and Principal Stages in the Design of Non-Profit Websites Pavel Makagonov, Celia B. Reyes Espinoza	115
Complex Networks in Recommendation Systems Massimiliano Zanin, Pedro Cano, Javier M. Buldú, Oscar Celma	120
Index Based Approach for Categorizing Online News Articles Taeho Jo	125
Discrete optimization of steel frame structures Stojan Kravanja, Tomaž Žula, Uroš Klanšek	131
Technology background of international coloboration on medicine multimedia knowledgebase establishment Karel Slavicek, Michal Javornik, Otto Dostal	137
Text Summarization of XML documents in Croatian Nives Mikelic Preradovic, Tomislava Lauc, Damir Boras	143
Cryptanalysis of cascaded convolucional transducers with local propagation Mohammad ali Oromiehchi, Fahimeh Mohebipoor	149
parallel mapping algorithms for a novel mapping & configuration software for the facets project Matthias Ehrlich, Karsten Wendt, Rene Schuffny	152
A fast on-line algorithm for the preemptive scheduling of equal-length jobs on a single processor Nodari Vakhania	158
A new study on optimal calculation of partial transmission ratios of two-step helical gearboxes Vu Ngoc Pi	162
Analysis of a Photonic Device through Laplace Transform V. Aboites, J. H. Garcia-Lopez, V. Pinto, A. V. Kiryanov, M. A. Barrera	166

Computer Simulation of Price Schocks Armando Barranon	170
Actionable Business Intelligence: How to Make It Available through Service-oriented Architectures Zeljko Panian	174
Design And Implementation Of A PC-Based Simulator For TARASHT Power Plant Alireza Yazdizadeh, Fathieh Majnon Mehrizi	180
Performance Analysis of Network Operating Systems Shaneel Narayan, Samad S. Kolahi, Rick Waiariki, Madeleine Reid	186
A graph theoretical approach for a multistep mapping software for the FACETS project Karsten Wendt, Matthias Ehrlich, René Schüffny	189
Microcontrollers and Modern Control Methods Vladimir Vasek, Petr Dostalek, Jan Dolinay, Dagmar Janacova, Karel Kolomaznik	195
Direction-Based Motion Detection Using the MPEG2 Encoder Josue A. Hernandez, Hiroyoshi Morita, Hector M. Perez	199
XML document similarity method in terms of the structure and contents. Woosaeng Kim	205
Enhanced Swarm-Like Agents for Multidimensional Data Clustering Mohamed El-sherif, Sherin Youssef, Mohamed Rizk	213
Discrete Computer Tomography Based on Rotating Projection Algorithm J. G. Vázquez Luna, A. Grebennikov, T. Valencia Perez, M. Najera Enriquez	220
Hierarchical Bayesian Approach for Ranking of Accident Blackspots with Reference to Cost of Accidents Noorizam Daud, Kamarulzaman Ibrahim, Kamaruzzman Sopian	227
The edge-pancyclicity of Dual-cube Extensive Networks Shih-Yan Chen and Shin-Shin Kao	233
Optimal Experiment Design for the Study of Thermal Destruction Aleksy V. Nenarokomov, Dmitry M. Titov, Eugene Artioukhin	237
The development of software and hardware for marble cutting tests Hasan Çimen, Said Mahmut Çinar, Mustafa Nartkaya	244
Inverse Problems in Heat Exchange Processes Andrés Fragueta, Juan-Antonio Infante, Ángel Manuel Ramos and José María Rey	250
Using Multiple Linear Regression to Forecast the Number of Asthmatics Darmesah Gabda, Noraini Abdullah, Kamsia Budin & C.K. Lim	256

General Ray Method and Computer Program Package for Explicit Solution of Boundary Value Problems for Elliptic Partial Differential Equations in Domains with Complicated Geometry Alexander Grebennikov	261
The Successful Deployment of Inventory and Forecasting Management System (INFORMS) in Telekom Malaysia™ Mohd Izhan Mohd Yusoff, Faizin Abu Bakar, Noor Azhari Md Yusof, Shahlan Kardi, Norazrina Abu Haris	266
SENHOD: Scarce-Resources Wireless Sensor Network for Healthcare in Oil Derricks Pablo Pancardo, Juan Carlos Dueñas	278
Architecture for filtering images using Xilinx System Generator Alba Sánchez, Ricardo Alvarez, Sully Sanchez, Juan Moctezuma	284
A new study on optimal calculation of partial transmission ratios of three-step helical reducers for getting minimal cross section dimension Vu Ngoc Pi	290
Fast algorithm for computer simulation of optical systems with partially coherent illumination Andrey Ostrovsky, Carolina Rickenstorff Parrao	294
Computer reconstruction of the coherent-mode structure of an optical field from the radiometric measurements data Andrey Ostrovsky, Carolina Rickenstorff Parrao	300
A Cmos quadrature oscillator based on a non linear system Arturo Prieto, Patricia Ortiz, Joel Garcia, Carlos Celaya, Jorge Illescas, Esteban Torres	305
Design and Implementation of Repeater System Based on CDMA/ARM Zhao Zhengjie, Zhang Jilong	310

AUTHOR INDEX

Abdullah, N.	256	Hernandez, J.A.	199
Aboites, V.	166	Hernandez-Gomez, R. A.	85
Alvarez, R.	284	Ibrahim, K.	227
Artioukhin, E.	237	Illescas, J.	305
Bakar, F.A.	266	Infante, J.A.	250
Barranon, A.	170	Jaimes-Reátegui, R.	110
Barrañón, A.	106	Janacova, D.	195
Barrera, M.A.	166	Javornik, M.	131
Bekhti, M.	29	Jilong, Z.	310
Boras, D.	143	Jo, T.	125
Boutte, A.	29	Kadjo , T.L.	65
Bradfor, P.	71	Kao, S.S.	233
Budin, K.	256	Kardi, S.	266
Buldú, J.M.J	120	Kim, W.	205
Cano, P.	120	Kirschning, I.	40
Castro, J.O.C.	60	Kiryanov, A.V.	166
Celaya, C.	305	Klanšek, U.	131
Celma, O.	120	Kolahi, S.S.	186
Ceyca Castro, J.O.	60	Kolomaznik, K.	195
Chaturvedi, A.K.	46	Koné, T.	65
Chávez-Aragón, J.A.	40	Kravanja, S.	131
Chen, S.Y.	233	Krishnan, A.	46
Çimen, H.	244	Larbi, N.	29
Çinar, S.M.	244	Lauc, T.	143
Diaz-Parra, O.	60	Lim, C.K.	256
Dolinay, J.	195	Luna, J.G.V.	220
Dostal, O.	131	Mahnic, V.	23
Dostalek, P.	195	Makagonov, P.	115
Dueñas, J.C.	278	Matsumoto, M.	79
Ehrlich, M.	189, 152	Mehrizi, F.M.	180
El-sherif, M.	213	Merad, L.	29
Enriquez, M.N.	220	Moctezuma, J.	284
Espinoza, C.B.R.	115	Mohebipoor, F.	149
Flores-Pulido, L.	40	Morita, H.	199
Flores-Quéchol, D.	40	Nakanishi, S.	79
Fraguela, A.	250	Nakano, M.	94
Fuentes-Penna, A.	60	Narayan,S.	186
Gabda, D.	256	Nartkaya, M.	244
Gallardo, J.A.L.	106	Nenarokomov, A.V.	237
Garcia, J.	305	Noorizam Daud,	227
Garcia-Lopez, J.H.	110, 166	Ojala, P.	34
Grebennikov, A.	220, 261		
Haris, N.A.	266		

Olivares-Rojas, J.C.	60	Schuffny, R.	152, 189
Oromiehchi, M.A.	149	Slavicek, K.	131
Ortiz, P.	305	Sopian, K.	227
Ostrovsky, A.	294, 300	Soro, A.	50
Oumtanaga, S.	65	Starostenko, O.	40
Pancardo, P.	278	Suarez-Cansino, J.	85
Panian, Z.	174	Sumitomo, K.	94
Pansari, S.	46	Tety, P.	65
Parrao, C.R.	294, 300	Titov, D.M.	237
Pasi Ojala	54	Tomizawa, K.	100
Perez, H.	94	Torres, E.	305
Perez, H.M.	199	Uchida, O.	79, 100
Perez, T.V.	220	Vakhania, N.	158
Pi, V.N.	90, 162, 290	Vasek, V.	195
Pinto, V.	166	Waiariki, R.	186
Pisarchik, A.N.	110	Wendt, K.	152, 189
Preradovic, N.M.	143	Yadav, D.	46
Prieto, A.	305	Yazdizadeh, A.	180
Ramos, A.M.	250	Youssef, S.	213
Reid, M.	186	Yusof, N.A.M.	266
Rey, J.M.	250	Yusoff, M.I.M.	266
Rizk, M.	213	Zabkar, N.	23
Rodrigues-Flores, J.I.	40	Zanin, M.	120
Ruiz-Vanoye, J.A.	60	Zhengjie, Z.	310
Sánchez, A.	284	Žula, T.	131
Sanchez, S.	284		



9 78-9640-6766-33 > 6