



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

August 12, 2016, Asuncion, Paraguay

**Helge Holden,
IMU Secretary
NTNU Trondheim,
Norwegen**

In ref.: Associate Membership of the Sociedad Matemática Paraguaya - SMP to the Internacional Mathematical Union

Dear Helge Holden,

Your contact was given to me by Marcelo Viana.

Enclosed please find a document that we plan to submit to the International Mathematical Union - IMU - together with an application to become an IMU Associate Member. We are aware of the limitations that our country faces in the mathematical discipline, and at the same time we are also making strong efforts in order to improve our mathematical skills, at all levels. Hence we believe that at this point it is crucial for us to be a associate member and to begin interchanging experiences with the IMU and with some of its members.

Let me thank you in advance for all advice aimed at turning this major objective of being a participating member of IMU into reality. We look forward to being a candidate as soon as possible, and we will be glad to receive your comments regarding the attached document contents, as well as the application procedure.

Best Regards,


**Christian Schaerer,
President SMP
Asuncion - Paraguay**

Celular Phone: +595-982-651880
Email: chris.schaerer@gmail.com



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

PARAGUAY'S REPORT TO THE INTERNATIONAL MATHEMATICAL UNION (IMU)

PARAGUAYAN MATHEMATICAL SOCIETY (SMP)

The Paraguayan Mathematical Society (SMP, for its acronym in Spanish) was founded in the year 1964. The purposes of the organization are, among others: i) to promote, foster, disseminate and consolidate the mathematical activity, and activities related to it in Paraguay; ii) to contribute to the development of mathematical sciences, and to foster, support and carry out research in the field of Mathematics and its applications; and iii) to encourage the development of scientific, cultural, unions and social relations among Paraguayan mathematicians, and people with interests in the mathematical activity in Paraguay.

The early years of the Paraguayan Mathematical Society are recorded in the 14 SMP Journals published from 1964 to 1968. Later, the organization went through an unstable period almost becoming extinct. Activities were resumed from the year 2000 to 2005, restoring communications with the international community. At the Meeting of Latin American Mathematical Associations, communications with Dr. Michel Jambu, Dr. Roberto Markarián, the Royal Spanish Mathematical Society (with which a reciprocity agreement was signed), and with the members of CEMAT (Mathematics Spanish Committee) were restored. These relations resulted in the opening of the first Master's Degree in Mathematics in Paraguay. Also, during this period, the organization's historical documents and library were retrieved.

In April 2009, the organization called an extraordinary meeting in which a new Board of Directors was elected with the purpose of restructuring the society and bringing together all mathematical activities diversely conducted by several organizations.

Currently, the Mathematical Society is a place of convergence for mathematical activities, and this is its main strength. The most remarkable characteristic of Mathematics and sciences in general in Paraguay is its gradient of positive growth. Such growth is mainly observed in the development of programs which foster science and knowledge. Thus, graduate programs have been launched, which aspire to achieve high standards of academic excellence, equally comparable to the ones required at a regional level.

CURRENT SITUATION OF THE EDUCATION SECTOR IN PARAGUAY

According to the 2012 National Census of Population and Housing, Paraguay has a population of 6,672,631. The distribution of population is fairly even between men (50.52%), and women (49.48%). By age group, the population under 24 years old is 52.68%. The range between 10 and 19 years old is represented by 20.95%, the 15 to 24 range is 19.99%, and the 10 to 24 range is 30.66%. As for the ageing population, people above 65 years old are represented by 5.28%, and the population over 80 years old is 0.9%.

The institutions responsible for national education are the Ministry of Education and Culture (MEC, for its acronym in Spanish) and the National Council on Education and Culture (CONEC, for its acronym in Spanish). This body proposes educational policies and encompasses their



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

implementation.

In its Magna Carta of the year 1992, Paraguay acknowledges that every person has the right to integral and life-long education. The government must guarantee the right to learn and equal opportunities to access the benefits of humanistic culture, science, and technology, without any discrimination. Education is a fundamental right of all human beings, which allows them to acquire knowledge and lead full social lives. Law N° 1,264, of May 14th, 1998, expands this constitutional principle granting education a priority role to reduce inequality and offer new opportunities to the whole country's population. The country's acknowledgment and commitment to education is reaffirmed with the ratification of a series of international treaties, statements and conventions that enshrine the right to education.

However, many studies show the alarming situation that the education system is undergoing. According to the Global Competitiveness Index (GCI) prepared by the World Economic Forum (2013-2014), the quality of the Paraguayan education system ranks 138th out of 148 countries assessed. Regarding the teaching quality of Science and Mathematics, Paraguay is ranked 142nd, whereas in terms of availability for training and research it holds the position 134.

According to the results of the Third Regional Comparative and Explanatory Study, (TERCE, for its acronym in Spanish), carried out by the Latin American Laboratory for the Assessment of the Quality of Education in the year 2013, Paraguay is below the average in relation to participating countries in all areas assessed, being categorized as “below regional average”. The country was unable to achieve similar scores to neighboring countries, including Peru, in any of the areas. Performance was better in private schools than in official schools, and in urban schools than in rural schools for both grades in all areas assessed. Regarding performance in Mathematics, Paraguay was one of the three countries that presented no improvement in third grade, and one of the two countries that presented a lower performance in sixth grade (OREALC/UNESCO, 2014).

TERCE's report includes recommendations based on the results of the research. At primary school level, teacher training is required, also, the review of curricula for the development of scientific and research skills, the promotion of reading and bilingualism, the access to educational services and early childhood care, and equality in the access to inclusive quality education. Furthermore, the improvement of reading spaces in homes and the participation of boys and girls in cultural activities should be encouraged.

MATHEMATICS EDUCATION AT UNIVERSITY LEVEL IN PARAGUAY

Paraguay has mainly two traditional universities: the National University of Asuncion and the Catholic University of Asuncion. Over the last few years, the number of private universities has increased substantially. This is due to the great demand of the young population to access university education. In particular, new universities offering a degree in Mathematics focus on training high school teachers. At present, the development of Mathematics is limited to the metropolitan area.

The National University of Asuncion has three mathematics departments in the School of Engineering, School of Exact and Natural Sciences, and Polytechnic School. The mathematics



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

departments of the Engineering and Polytechnic Schools support mainly the training of engineers. Discussions are being held for the Mathematics Department of the School of Engineering to offer a more complete training to the students in the area of mathematics, including components of pure mathematics.

The Polytechnic School, in its Graduate Degree in Computer Science, offers an area and a laboratory of Applied Mathematics. Around twenty students have graduated from the Graduate Degree in Computer Science (Master's and PhD; both academic and research programs), and it currently has around twenty students pursuing the scientific master's and PhD.

The School of Natural and Technological Sciences from the National University of Concepcion, offers a Bachelor's Degree in Mathematics and Physics, with a duration of 4 years, as well as a Bachelor's Degree in Applied Mathematics (a reconversion of the Bachelor's Degree in Mathematics and Physics, 4 years) and Civil Engineering (5 years). They have been operating since 2014, with a common study program in the first four semesters.

The Mathematics Department of the School of Exact and Natural Sciences of the National University of Asuncion (FACEN, for its acronym in Spanish), offers a Bachelor's Degree in Mathematics with emphasis on pure mathematics and statistics. They both have an eight-semester duration, four of which are common. The content of the subjects is simple, and in the case of statistics, it is basically oriented to the training of technicians.

FACEN offers a Master's Degree in Mathematics with the main purpose of providing higher education to undergraduates in Mathematics and related fields, so as to install and consolidate a quality referent in the mathematical activity, teaching and pure and applied research, which contributes to a qualitative improvement of science and technology. The program's graduates are expected to contribute to the integration of a solid academic-scientific community, which is able to meet the challenges brought about by this so-called era of knowledge in order to foster the strengthening of basic sciences through Fundamental and Applied Mathematics.

The National University of Asuncion has begun the strengthening process of the undergraduate programs and the creation of graduate programs as an improvement mechanism of the academic standard. Within this context, **researcher professors with exclusive dedication** were incorporated into the National University.

The first PhD program of the National University was in Computer Science and the Laboratory of Computational and Applied Sciences was created (with a division of Applied Mathematics). Both the graduate and the laboratory have received more than 40 professors from universities in Europe and the Americas. This graduate program has been chosen as one of the six Excellence Programs by the CONACYT of Paraguay, and all its researchers have been categorized by the PRONII (National Program of Incentives for Research), as well as assessed by international external peers.



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

STRENGTHENING OF MATHEMATICAL EDUCATION

The Paraguayan Mathematical Society supports the following activities and programs which are fostered by the Multidisciplinary Organization of Support to Teachers and Students (OMAPA).

• Mathematical Olympiads

Paraguay has participated in the International Mathematical Olympiads since the year 1986 with the participation of hundreds of students. Despite being ranked in the last positions of international qualified candidates at the beginning, today the country is better positioned.

Since the year 1986, OMAPA has been promoting the undertaking of national mathematical competitions, where students, schools and teachers participate voluntarily. These are contests among students separated into categories who compete in problem solving.

Over the last few years, the National Mathematical Olympiads have had 30,000 participants per year. In the year 2012, this number grew to 150,000 students and by the year 2014, more than 300,000 students have participated, 2,500 schools, and more than 5,000 teachers from all over the country.

An impact evaluation completed in 2014 under the supervision of José Daniel Bogoya shows that those schools which have participated for many years in the Mathematical Olympiads have a higher performance in mathematics in 6th and 9th grades compared to those who have participated fewer times.

• Young Talents Program

Through the Scientific Initiation Program with an emphasis in Mathematics for Young Talents, outstanding students from the Mathematical Olympiads are invited to participate in intensive mathematics courses and in training and participation in International Olympiads such as Southern Cone, Riverplate, Latin American and International Olympiads.

This program has significantly increased its coverage: starting with approximately 40 participants, between the years 2011 and 2013 more than 500 students from 13 different provinces have participated in the program. Around 20 graduates are now pursuing undergraduate or graduate degrees in prestigious universities in the United States (MIT, Columbia, Stanford, Cornell), in Spain, Italy, Brazil, Argentina, India, and others.

• Paraguayan Olympiads of Astronomy and Astronautics

This competition is directed to all third cycle students of Elementary and Middle School Education who have an interest in any of these disciplines. Engineer Miguel Volpe and the Paraguayan Astrophysics Club are in charge of its academic direction. It also has the support of the Paraguayan Mathematical Society.



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

PROMOTING RESEARCH

The National Council of Science and Technology (CONACYT) has been implementing the National Program of Incentives for Research (PRONII) since the year 2011, with the purpose of strengthening and expanding the country's scientific community. This initiative seeks to foster the researcher career in Paraguay, through its categorization, assessment of its scientific and technological production, as well as through granting economic incentives.

It is worth noting that supporting research in all its areas is very recent in Paraguay. Nonetheless, important steps have been taken. Below, we mention actions related to the area of mathematics:

1. Categorization of Researchers:

- a. Reference research doctors in the field established in the country: Benjamín Baran (Optimization), Diego Pinto (Optimization), Horacio Legal (Mathematical Morphology), Christian Schaerer (Numerical Methods), Marcos Villagra (Complexity Theory), Denis Redwitz (Analysis).
- b. Paraguayan doctors living abroad with a possibility of immediate return: Mauricio Poletti (Dynamic Systems), Carlos Galeano (Fluid Dynamics), Hugo Checo (Fluid Dynamics), Andrés Cudas (Optimization).
- c. Soon to graduate doctors: Carlos Sauer, Inocencio Ortiz.
- d. In addition to the aforementioned, there are around ten Paraguayan students pursuing the PhD in Mathematics.

2. **PROCIENCIA.** The Paraguayan Program for the Development of Science and Technology (PROCIENCIA), with an investment of \$125 million for the period 2014-2018, aims at strengthening national skills for scientific research and technological development so as to contribute to the increase of productive capacity and competitiveness, and improve life quality in Paraguay.

Within the framework of PROCIENCIA, research and graduate projects are being funded. For example, in the area of Mathematical Education, the Master's in Didactics of Sciences with an emphasis on Mathematics, Physics and Chemistry of the National University of Concepcion has been created in addition to projects related to the sub-space of Krylov, Control, Mathematical Models and the Theory of Complexity.

3. **BECAL.** “Don Carlos Antonio López” National Scholarship Program for Study Abroad to Strengthen Research, Innovation and Education in Paraguay aims at increasing the levels of knowledge generation and application in the fields of Science and Technology; as well as the learning levels in education through the improvement of the supply of advanced skilled human capital in said fields. This program expects to increase the number of researchers with PhD and Master's degrees in the fields of Science and Technology, and in other relevant areas for the country's development, as well as to increase the number of educators with Master's in Education, and with training in diverse



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

fields of knowledge. This program is led by a Committee of Strategic Coordination, coordinated by its UEP which reports to the Ministry of Finance and directly related to the Ministry of Education and Culture (MEC), with the National Council of Science and Technology (CONACYT), and with the Technical Secretariat for Planning of Economic and Social Development (STP, for its acronym in Spanish). The program is funded by the **Fund for the Excellence of Education and Investigation** (FEEI, for its acronym in Spanish), and by the **Inter-American Development Bank (IADB)**. This program has \$70 million to be invested in student grants. An important percentage is being allocated for mathematics.

MATHEMATICAL RESEARCH

The SMP has had participation in the constant outlining of strategies for the development and consolidation of research in Paraguay. In fact, many of its members are active researchers. The production of publications with researchers' participation has been growing over the last few years. In Annex 1, there are references to articles and research carried out from 2004 to 2011.

Paraguay has participated in the “Mathematics in Latin America and the Caribbean: Challenges and Opportunities” (2014) report, drafted by the Commission of Developing Countries of the International Mathematical Union. On this report, Paraguay's growth in mathematics stands out as well as the efforts that are being made for the strengthening of mathematics in the country and its insertion in the continent: *“Paraguay is an example in which the joint efforts of local mathematicians (who also obtained state contributions), UMALCA (particularly some of the member countries) and European countries (France and Spain) succeeded in producing a germ of mathematical development that should be still supported for some years to produce lasting effects and to contribute to the fact that the benefits reach the teaching of mathematics in primary and secondary schools”*.

Year	Number of publications: refereed articles and congresses
2004	1
2005	1
2006	3
2007	4
2008	5
2009	14
2010	32
2011	31



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

2012	11
2013	19
2014	43
2015	18
2016	6 (to this day)

Table: Evolution of publications in Computer Science and Mathematics with active participation of members of the SMP since 2004.

ACTIVITIES IN EDUCATION

The **Ibero-American Symposium on Mathematics Education**, held in Paraguay on September 20th, 21st and 22nd of the year 2010, was directed mainly to Paraguayan teachers and students, and had the participation of Mathematics researchers, teachers, and students from different countries. Its objectives were: i) to analyze the educational demands for the sustenance of the purpose of mathematical training activities at different levels of Ibero-American education systems; ii) to update and disseminate mathematical knowledge among Spanish and Portuguese speaking teachers through the incorporations of new technologies aimed at implementing the teaching-learning processes of mathematics; iii) to formulate new approaches that make the action-research in a Mathematics class more efficient, and iv) to promote cultural interaction among Portuguese and Spanish speaking teachers with ideas, emotional reactions and behavioral standards.

Applied Mathematics and Computing for Engineering Workshop, held on October 25th and 26th of the year 2010, at the National University of Asuncion (UNA). It was organized by the School of Engineering - UNA and the SMP.

First Paraguayan Colloquium of Mathematics and Related Sciences, held from October 10th to 15th in 2011 at the National University of Asuncion. Prof. Dr. Juan Migliore of the Notre Dame University (USA), and Prof. Dr. Chris Peterson from the University of Colorado (USA) lectured the *Algebraic Geometry* course. *The Introduction to Functional Analysis* course was lectured by Dr. Roberto Markarián, from the University of the Republic (URUGUAY), Prof. Dr. María Laura Schuverdt, from La Plata University (ARGENTINA) presented the *Optimization with Algorithms* course. Prof. Dr. Alexander Arbieto of the UFRJ-Brazil lectured the *Dynamic Systems* course. Prof. Dr. Eduardo Wagner developed the course on *Functions*.

Course on Introduction to Analysis on the Line, held from 8th to 26th of July in the year 2013. It was lectured by Mauricio Poletti from the Institute of Pure and Applied Mathematics (IMPA, for its acronym in Spanish) from Rio de Janeiro, Brazil and current member of the SMP. The course was offered at no cost and it had 33 attendees. The best students were encouraged to attend the summer course offered by IMPA. Three students received student grants to attend such course.



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

Course on Analysis on the Line, held between July 7th and August 1st of the year 2014, with a 6-hour per week class load, totaling 24 hours of theory, lectured on Mondays, Wednesdays and Fridays from 2:00 to 4:00pm. The lecturer was M.Sc. in Mathematics Mauricio Poletti, from the Institute of Pure and Applied Mathematics (IMPA), Rio de Janeiro, Brazil.

Likewise, other lecturers were Roberto Viveros, student at the Master's degree from the IMPA and Luis Nasi, student at the School of Engineering of the National University of Asuncion. The content of the course was: **1- Set Theory:** sets, injective, over-injective and bi-injective functions. **2- Natural Numbers:** mathematical induction, finite and infinite sets, countable sets. **3- Real Numbers:** Properties of real numbers. **4- Sequence:** limits of a sequence, inequality, and operations with limits, infinite limits. **5- Line Topology:** open, closed and compact sets.

The SMP launched Paraguay as a candidate for holding the Congress of Computational Interdisciplinary Sciences (CCIS, for its acronym in Spanish) in the year 2014, together with the Laboratory of Scientific and Applied Computational Science from the Polytechnic School of the National University of Asuncion.

The III Congress of Computational Interdisciplinary Sciences was held from September 30th to October 3rd, 2014 at the campus of the National University of Asuncion, directed to researchers and students who work in the different fields of science which make use of computational science in their research projects. The event was organized by the SMP, the Polytechnic School of the National University of Asuncion, the Autonomous University of Asuncion, and the Pan-American Association on Computational Interdisciplinary Sciences – PACIS.

The objective of the congress was to seek, in an innovative manner, an inter- and multidisciplinary dialogue in which researchers from different fields could share their experiences and find solutions to their IT problems. Also, to strengthen the links between basic and applied research and theoretical and experimental methods which involve Computational Science and Computational Mathematics. Master lectures, as well as ordinary sessions and tutorials were held, all related to Computational Mathematics, Computational Physics, Computational Astronomy, Computational Chemistry and Computational Biology, apart from topics such as calculation methods applied to space and Environmental Sciences, Technology, Innovation, Economics, among others.

Fifty-three scientific presentations were carried out through posters sessions, and for the oral presentations, research papers from all over the world were received, totaling around 100, which were selected by a scientific committee. The papers came mainly from Argentina, Germany, Belgium, Brazil, Chile, Italy, Japan, Mexico, The Netherlands, Paraguay, Poland, Spain, Switzerland, The United States, and Uruguay. Furthermore, the conferences held were lectured by the following speakers: Flavio Fenton from the School of Physics, Georgia Tech (USA), Anne De Wit and Geneviève Dupont from the Université Libre de Bruxelles (Belgium), and David Laroze from the High Investigation Institute (Chile). Also, conferences were presented by Luiz Bevilacqua from the Federal University of Rio de Janeiro (Brazil), Dr Alberto Paccanaro from the Royal Holloway, University of London (England), and Dr. Paul Bourguine from the Ecole Polytechnique (France), among others.

The Summer School of **Computational Algebra and Number Theory** was held from the 5th to



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

the 10th of December 2014 in the city of Montevideo, Uruguay. It was organized by the Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy. The event featured speakers from the University of Buenos Aires, University Rennes 1 from France, and the University of Leiden from The Netherlands. The objective of such school consisted in presenting the latest theoretical advances in Algebra and Number Theory, as well as computational techniques that allow solving the stated problems efficiently.

Three topics were addressed: i) Arithmetic Nullstellensätze and Applications by Teresa Krick (University of Buenos Aires); ii) Elliptic Curves and its Applications to Cryptography by Christophe Ritzenthaler (Université Rennes 1); ii) Algebraic Number Theory by Peter Stevenhagen (Universiteit Leiden).

The school consisted of: i) theoretical lessons and computational simulations open to questions and debates; ii) solving problems given by teachers in mixed groups; iii) presentation of results (theory and computational simulation) of the group before the class, debating and defending the proposed solution.

Visitors: César Caretta, professor and astronomer of the University of Guanajuato, visited Paraguay to lecture classes at the Autonomous University of Asuncion, at the School of Exact and Natural Sciences - FACEN (for its acronym in Spanish), at the Polytechnic School of the UNA - FPUNA (for its acronym in Spanish), in the Program for Young Talents of OMAPA and at the Club of Astrophysics of Paraguay. More than 400 people attended his talks.

Course on Abstract Algebra with Applications in Engineering, held on July 20th to 31st in 2015, at the Polytechnic School, UNA's campus - San Lorenzo City. The free course was lectured by teachers Juan Carlos Migliore and Christopher Peterson from the University of Notre Dame and Colorado State, respectively. Also, teacher Andrea Solotar gave a talk and participated in work meetings with colleagues in order to delineate a development strategy in the area of Algebra in Paraguay for the years 2016 and 2017.

INTERNATIONAL CONGRESSES

- **School of Mathematics of Latin America and the Caribbean - EMALCA** (for its acronym in Spanish).

The School of Mathematics of Latin America and the Caribbean in its EMALCA PARAGUAY 2009 edition, was organized by the SMP and supported by the School of Engineering - FIUNA, and the School of Exact and Natural Sciences - FACEN, both from the National University of Asuncion, and the Union of Mathematical Societies in Latin America and the Caribbean - UMALCA. It was held at the School of Engineering at the university campus, which had the appropriate infrastructure to conduct the school. FIUNA and FACEN supported the event financially, along with the Association of Universities "Group of Montevideo" (AUGM, for its acronym in Spanish), and the South American Program of support to the activities of cooperation in Science and Technology PROSUL (Brazil). It also had the support of OMAPA and CONACYT from Paraguay, of the IMERL from the University of the Republic (Uruguay) and from the Institute of Pure and Applied Mathematics - IMPA (Brazil).



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

This EMALCA edition was the third one organized in Paraguay as a continuation of the activities for the strengthening of Mathematics in the country. Previous events include the EMALCA PARAGUAY 2005, the EMALCA 2007 and the courses: Analysis on the Line, Linear Algebra and Introduction to the Probability Theory and Metric Spaces. This way, the continuation of activities in the area allows valuing, fostering and stimulating the post-graduation process that is being developed in Paraguay, and it also shows the seriousness of the consolidation work of mathematics.

The EMALCA PARAGUAY 2011 was organized in parallel with the First Paraguayan Colloquium of Mathematics and Related Sciences, which allowed the interaction of high school and university teachers.

- **International Congress of Mathematicians.**

In August 2014, José Vázquez presented a research paper at the International Congress of Mathematicians – ICM, held in Seoul, Korea, (<http://www.icm2014.org>). It is important to mention that this is the first time in history that a Paraguayan presents a research paper at the ICM.

- **Congress of the Americas.**

Juan Carlos Cabral participated in the Congress of the Americas in the city of Guanajuato, Mexico, with the support of the Graduate Program in Computational Sciences from the Polytechnic School of the UNA. Likewise, he has also participated in organizational meetings for the confirmation of the Council of the Americas. The SMP is a member of the Council of the Americas since its foundation, and it has supported the Congress of the Americas undertaking from the beginning.

NETWORKS AND ALLIANCES

- **Mathematical Modelling Center, University of Chile.**

In the year 2014 a bi-ministerial mission was carried out by Ministers David Ocampos and Luis Lima Morra to Chile to visit the Mathematical Modelling Center - CMM (in Spanish) from the University of Chile, as well as the Foundation INRIA - Chile <http://www.inria.cl>. In it, intentions of collaborative work were signed and agreed in order to support Paraguayan institutions in the corresponding areas of the visited institutions. The Paraguayan Embassy in Chile organized an honor reception to the ministers with fellow colleagues and researchers from Chile.

OMAPA, which works as a partner institution with SMP, has encouraged the creation of the Mathematical Education Upgrade Project, with the support of the CONACYT. The main objective of this project is to investigate the cause and effect relations in the educational work for groups of 1st to 6th grades of Basic School Education. Another main objective is to implement an innovative proposal to update Mathematical Education. The project has the advice of specialists from the Mathematical Modeling Center of the University of Chile, for the development of the academic proposal as well as for the design, implementation and interpretation of the results of the research. Also, six Paraguayan educators are currently pursuing the Certificate Course in Mathematical Education Updating, lectured by experts of the CMM.



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

- **School of Education, Boston University.**

The upgrade project in Mathematical Education encouraged by OMAPA has the support of the School of Education of Boston University. The support consists in the provision of 26 didactic units of teacher trainings in Fractions, Geometry and Number Theory to incorporate into the academic proposal.

- **ICMI – CANP 5 Andean Region and Paraguay.**

The Capacity and Networking Project-CANP has as its main objective to establish a network of contributions among developing countries to meet the challenges of a skilled mathematical education; it is encouraged by ICMI (International Commission of Mathematical Instruction) with the support of the IMU (International Mathematical Union), UNESCO (United Nations Organization for Education, Science and Culture) and ICSU (International Council for Science).

In February 2016, a Paraguayan delegation participated in the Fifth edition of the event CANP, held in Lima, Peru. For this, a report about the initial and continuing training in mathematics in Paraguay was elaborated. In these exchange spaces with specialists, contacts and counseling with doctors Masami Isoda, Ferdinando Arzarello, Vicenç Font, Luis Radford, Patrick Scott and Michèle Artigue have been created.

Currently, we are working together in the elaboration of the Standards for Essential Mathematical Skills in Teachers of Elementary and Middle School Education. One hundred Problem Solving Didactic Units from Alan Schoenfeld have been supplied (K6 to K-12).

- **UMALCA.**

The SMP is a member of the Union of Mathematical Societies in Latin America and the Caribbean - UMALCA. We have participated in the drafting of the new bylaws for the UMALCA, and in new regulations for the Latin American Congress of Mathematics - CLAM (in Spanish).

- The SMP is a member of the Mathematical Council of the Americas - MCofA.

ANNEX I

Below, participations in events with references are presented, as well as scientific articles published by the researchers in Mathematics and Computational Science related to the SMP. It is important to highlight that the list below is only indicative and does not constitute a strict or complete assessment of the publications in the country.

2016

1. Lino Chamorro, Fabio López-Pires, Benjamín Barán, "A Genetic Algorithm for Dynamic Cloud Application Brokering". Accepted at 4th IEEE International Conference on Cloud Engineering (IC2E 2016). Berlin, Germany.
2. Sara Arévalos, Fabio López-Pires, Benjamín Barán, "A Comparative Evaluation of Algorithms for



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

Auction-based Cloud Pricing Prediction". Accepted at 4th IEEE International Conference on Cloud Engineering (IC2E 2016). Berlin, Germany.

3. Jammily Ortigoza, Fabio López-Pires, Benjamín Barán, "A Taxonomy on Dynamic Environments for Provider-oriented Virtual Machine Placement". Accepted at 4th IEEE International Conference on Cloud Engineering (IC2E 2016). Berlin, Germany.
4. Diego Ihara, Fabio López-Pires, Benjamín Barán, "Many-Objective Virtual Machine Placement for Dynamic Environments". 8th IEEE/ACM International Conference on Utility and Cloud Computing (UCC 2015). Limassol, Cyprus.
5. Enrique Dávalos, Cristian Aceval, Victor Franco, Benjamín Barán. "VNE-MOILP: A Multi-objective approach for VNE problem". Aceptado para su publicación en "CLEI Electronic Journal" – 2016.
6. Enrique Dávalos, Cristian Aceval, Victor Franco, Benjamín Barán. "VNE-MOILP: A Multi-objective approach for VNE problem". Aceptado para su publicación en "CLEI Electronic Journal" – 2016.

2015

1. Sara Arévalos, Fabio López-Pires, Benjamín Barán, "Auction-based Resource Provisioning in Cloud Computing. A Taxonomy". XLI Latin American Computing Conference (CLEI 2015). Arequipa, Perú.
2. Fabio López-Pires, Benjamín Barán, "A Many-Objective Optimization Framework for Virtualized Datacenters". 5th International Conference on Cloud Computing and Service Science (CLOSER 2015). Lisbon, Portugal.
3. Fabio López-Pires, Benjamín Barán, "A Virtual Machine Placement Taxonomy". 15th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGrid 2015). Shenzhen, Guangdong, China.
4. Enrique Dávalos, Cristian Aceval, Victor Franco, Benjamín Barán. "A multi-objective approach for virtual network embedding" Informatica (CLEI), 2015 XLI Conferencia Latinoamericana En , vol., no., pp., Octubre 2015
5. Enrique Dávalos, Marcos Tilería, Aloysious Yu, Benjamín Barán. "Network Virtualization in optical networks with traffic grooming" Informatica (CLEI), 2015 XLI Conferencia Latinoamericana En , vol., no., pp., Octubre 2015.
6. Luis Guillermo Moré Rodríguez; Marcos Andrés Brizuela Núñez; HORACIO LEGAL-AYALA; DIEGO PINTO ROA; José Luis Vázquez Noguera; PARAMETER TUNING OF CLHEB A SEDONMULTI-OBJECTIVE OPTIMIZATION TO ACHIEVE DIFFERENT CONTRAST LEVELS IN MEDICAL IMAGES. In: IEEE International Conference on Image Processing (ICIP), 2015 Quebec, Canadá 2015.
7. Martin Poletti ; HORACIO LEGAL-AYALA; JACQUES FACON; Claudio Barua; José Luis



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

- Vázquez Noguera; EducationalWeb-Tool for Digital Image Processing . In: XLI Conferencia Latinoamericana en Informática (CLEI 2015), 2015 Arequipa, Perú. 2015.
8. Carlos Otero; Daniel Luna; Alvin Marcelo; Humberto Mandirola; Walter Curioso; Pablo Pazos; Mowafa Househ; Cynthia Villalba; Why Patient Centered Care Coordination Is Important in Developing Countries?, IMIA Yearbook, 2015.
 9. Jorge Céspedes; Cynthia Villalba; Towards Improving Hypertensive Patients Care: Pervasive Monitoring and Diagnosis Support. In: 15th. World Congress on Medical and Health Informatics, 2015 Sao Paulo, Brasil.
 10. Liz Baez; Cynthia Villalba; Juan Pablo Nogués Peña; Comparación de Mapas de Riesgo de Contaminación del Acuífero Patiño. In: IV Congreso Paraguayo de Recursos Hídricos , 2015 San Lorenzo, Paraguay 2015.
 11. Cynthia Villalba; Juan Pablo Nogués Peña; Liz Baez; Mapeo del Riesgo de Contaminación del Agua Subterránea del Acuífero Patiño. In: IV Congreso Paraguayo de Recursos Hídricos , 2015 San Lorenzo, Paraguay 2015.
 12. KOZAKEVICIUS, A.; CAPPO, C.; MOZZAQUATRO, B.; CERETTA NUNES, RAUL; C.E. Schaerer; URL query string anomaly sensor designed with the bidimensional Haar wavelet transform, International Journal of Information Security, v. 1, p. 1-21, 2015.
 13. CEBRIA N, J.; Castan, A.; MARTINEZ, V.; KADOMATSU, J.; Parra, C.; FERNANDEZ-NESTOSA, M.J.; C.E. Schaerer; HERNANDEZ, P. ; KRIMER, D.B.; SCHVARTZMAN, J.B.(;RELEVANTE) Direct Evidence for the Formation of Precatenanes During DNA Replication, The Journal of Biological Chemistry, 2015.
 14. GRILLO, S. ; BLANCO, G. ; C.E. Schaerer; Path integration for real options, Applied Mathematics and Computation, v. 265, p. 120-132, 2015.
 15. P. TORRES; C.E. Schaerer; BHAYA, A.; Varying the block size on block conjugate gradient: comparison of strategies. In: 1st Pan-American Congress on Computational Mechanics - PANACM 2015, 2015 Buenos Aires Proceedings of the 1st Pan-American Congress on Computational Mechanics - PANACM 2015. 2015.
 16. P. TORRES; C.E. Schaerer; BHAYA, A.; On Solving Linear Systems Using Adaptive Strategies for Block Lanczos Method . In: SIAM Conference on Applied Linear Algebra, 2015 Atlanta, USA Proceedings of the 2015 SIAM Conference on Applied Linear Algebra. 2015.
 17. Edith Falcon-de Legal; Marta Ascurra; Gislaine Custódio; LEGAL, H.; Magna Monteiro; Maria C. Vega; María José Fernández; Sonia Vega; Elis Rosane Sade; Izabel Coelho; Enilze M. S. F. Ribeiro; Iglénir J. Cavalli; Bonald C. Figueiredo; Prevalence of an inherited cancer predisposition syndrome associated with the germ line TP53 R337H mutation in Paraguay: How does the mutation cross borders?, Cancer Epidemiology, v. 39 f. 2, p. 166-169, 2015
 18. L. Dominguez; S. Patiño; A. Ribeiro; M. Varela; M. Monteiro; Sodium Ions Uptake by Hydroxyapatite from Bovine Bone, Materials Science forum, v. 820, p. 545- 548, 2015. <http://>



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

www.ttp.net/978-3-03835-484-0/10.html

2014

1. Fabio López-Pires, "Multi-Objective Virtual Machine Placement with Service Level Agreement". XXI Latin American Contest of Master Thesis (CLTM 2014), XL Latin American Computing Conference (CLEI 2014). Montevideo, Uruguay.
2. Fabio López-Pires, Elias Melgarejo, Benjamín Barán, "Optimal Virtual Machine Placement. A Multi-Objective Approach". FPUNE Scientific Journal. ISSN 2222-2286.
3. Enrique Dávalos, Benjamín Barán, Diego Pinto. "A survey on optical network virtualization". CCIS 2014, 3rd Conference on Computational Interdisciplinary Sciences, Asunción, Paraguay, Octubre 2014
4. José Luis Vázquez Noguera; HORACIO LEGAL-AYALA; C.E. SCHAEERER; JACQUES FACON; A COLOR MORPHOLOGICAL ORDERING METHOD BASED ON ADDITIVE AND SUBTRACTIVE SPACES. In: IEEE International Conference on Image Processing, 2014 Paris, Francia 2014.
5. - Marcos Andrés Brizuela Núñez; Luis Guillermo Moré Rodríguez; José Luis Vázquez Noguera; HORACIO LEGAL-AYALA; DIEGO PINTO ROA; Particle Swarm Optimization applied to parameter tuning of CLAHE based on Entropy and Structural Similarity Index. In: 3rd Conference of Computational Interdisciplinary Sciences, 2014 Asunción 2014.
6. José Luis Vázquez Noguera; HORACIO LEGAL-AYALA; C.E. SCHAEERER; JACQUES FACON; Morphological reconstruction in additive and subtractive image color spaces. In: International Congress of Mathematicians ICM 2014 Seoul, Korea 2014.
7. NERY MACHADO; José Luis Vázquez Noguera; HORACIO LEGAL-AYALA; Segmentation of melanoma images. In: XXXV CONGRESSO NACIONAL DE MATEMÁTICA APLICADA E COMPUTACIONAL, 2014 Natal-RN 2014.
8. Jesús Romero; Pablo López; Cynthia Villalba; José Vázquez; Diego Pinto; CHIEM: A Centralized Health Information Exchange Model. In: 3rd. Conference on Computational Interdisciplinary Science, 2014 San Lorenzo, Paraguay.
9. Jorge Céspedes; Cynthia Villalba; Pervasive Monitoring of Ambulatory Hypertensive Patients and Diagnosis Support. In: 3rd. Conference on Computational Interdisciplinary Science, 2014 San Lorenzo, Paraguay
10. Pablo López; Jesús Romero; Cynthia Villalba; José Vázquez; Diego Pinto; Modelo de Sistema PHR confidencial con datos unificados y de acceso ubicuo. In: VI Congreso Iberoamericano de Informática Médica Normalizada, Conferencia Latinoamericana de Informática Médica, 2014 Montevideo, Uruguay 2014.
11. Jorge Céspedes; Cynthia Villalba; Wearable Technologies In Pervasive Monitoring of Hypertensive Patients and Diagnosis Support. In: VI Congreso Iberoamericano de Informática



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

- Médica Normalizada, Conferencia Latinoamericana de Informática Médica, 2014 Montevideo, Uruguay 2014.
12. Liz Baez; Juan Pablo Noguez Peña; Cynthia Villalba; Web Geographic Information System to visualize the Patiño Aquifer vulnerability to contamination. In: 3rd. Conference on Computational Interdisciplinary Science, 2014 San Lorenzo, Paraguay.
 13. Alberto Capli; Nora González; Claudio Barúa; Cynthia Villalba; Real Time Locating System using Wi-Fi. In: 3rd. Conference on Computational Interdisciplinary Science, 2014 San Lorenzo, Paraguay
 14. Claudio Barúa; Daniel Romero; Cynthia Villalba; Un Análisis sobre la Asignación de Recursos en Procesos de Negocio. In: 2º Congreso Nacional de Ingeniería Informática/Sistemas de Información, 2014 San Luis, Argentina
 15. BOTTA, R.; BLANCO, G. ; C.E. Schaerer; Evolution of cooperation in evolutionary games for Sanitation Boards, C L E I Electronic Journal, 2014.
 16. CEBRIA N, J.; KADOMATSU, J.; Castan, A.; MARTINEZ, V.; Parra, C.; FERNA NDEZ-NESTOSA, M.J.; C.E. Schaerer; Martinez-Robles, M.L.; HERNA NDEZ, P. ; KRIMER, D.B.; Stasiak, A.; SCHVARTZMAN, J.B.; (RELEVANTE) Electrophoretic mobility of supercoiled, catenated and knotted DNA molecules, Nucleic acids research (Online), 2014.
 17. CACERES, J.J.; BARA N, B.; C.E. Schaerer; Implementation of a distributed parallel in time scheme using PETSc for a parabolic optimal control problem. In: Federated Conference on Computer Science and Information Systems (FedCSIS), 7-10 Sept. 2014., 2014 Warsaw Proceedings of the Federated Conference on Computer Science and Information Systems (FedCSIS). 2014
 18. CESPEDES, P.; H. LEGAL ; C.E. Schaerer; Mutual information extreme optimization for multimodal medical image registration. In: Conferencia Latinoamericana de Informatica - CLEI, 2014 Montevideo Computing Conference (CLEI), 2014 XL Latin American, INSPEC Accession Number: 14760733, DOI: 10.1109/CLEI.2014.6965101. 2014.
 19. GAONA, G. ; PE REZ, J. ; C.E. Schaerer; VILLAMAYOR BENIALBO, W.; Recognizing human postures in video sequences using Contour-Poing Signature. In: Conferencia Latino-Americana de Informatica, 15-19 Sept. 2014, 2014 Montevideo Computing Conference (CLEI), 2014 XL Latin American. 2014.
 20. GAONA, G. ; PE REZ, J. ; C.E. Schaerer; VILLAMAYOR BENIALBO, W.; Recognizing human postures in video sequences using Contour-Poing Signature. In: Conferencia Latino-Americana de Informatica, 15-19 Sept. 2014, 2014 Montevideo Computing Conference (CLEI), 2014 XL Latin American. 2014.
 21. J.L.V. NOGUERA; H. L. AYALA; C.E. Schaerer; FACON, J. ; A color morphological ordering method based on additive subtractive spaces . In: IEEE International Conference on Image Processing, 2014 Paris Prceedings of the ICIP 2014. 2014.



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

22. GAONA, F. ; JARA, A.; VERA, M. ; AQUINO, S. ; C.E. Schaerer; MONTEIRO, M. ; JUIZ, C. ; SERRA, B. ; VEGA, CELESTE; ROJAS DE ARIAS, A. ; Using infrared photoelectric sensors Interdisciplinary Sciences, 2014 Asuncion Proceedings of the CCIS 2014. 2014 for automatic detection of reinfestation by *Triatoma infestans*. In: Conference of Computational.
23. CABRAL, J.C.; C.E. Schaerer; Harmonic Ritz control strategy for restarting GMRES(m). In: 3rd Congress of Computational Interdisciplinary Sciences, 2014 San Lorenzo, Paraguay. Proceeding of the 3rd Congress of Computational Interdisciplinary Sciences. 2014.
24. CACERES SILVA, J. J. ; BARA N, B.; C.E. Schaerer; Implementation of a distributed parallel in time scheme using PETSc for a Parabolic Optimal Control Problem. In: Conference on Computer Science and Information Systems, 2014 Warsaw, Poland Proceedings of the 2014 Federated Conference on Computer Science and Information Systems, Warsaw, Poland, September 7-10, 2014. DOI: 10.15439/2014F340. 2014
25. GAONA, F. ; C.E. Schaerer; ROJAS DE ARIAS, A. ; Empleo de sensores foto-electricos infrarojos para la deteccion automatica de infestacion por *Triatoma infestans*. In: 3rd Conference of Computational Interdisciplinary Sciences, 2014 San Lorenzo Proceedings of the 3rd Conference of Computational Interdisciplinary Sciences. 2014.
26. Dias, J.J.C. ; Viveros, R.A. ; SAITO, M.; C.E. Schaerer; Parabolic optimal control constrained optimization using active restriction method. In: 3rd Congress of Computational Interdisciplinary Sciences, 2014 San Lorenzo, Paraguay. Proceedings of the 3rd Congress of Computational Interdisciplinary Sciences. 2014
27. Rodriguez-Aseretto, D. ; de Rigo, D. ; C.E. Schaerer; Architecture of environmental risk modeling: for a faster and more robust response to natural disasters. In: 3rd Conference of Computational Interdisciplinary Sciences, 2014 San Lorenzo Proceedings of the 3rd Conference of Computational Interdisciplinary Sciences. 2014.
28. KADOMATSU, J.; CEBRIA N, J.; Castan, A.; MARTINEZ, V.; Parra, C.; FERNANDEZ, M.J.; C.E. Schaerer; HERNA NDEZ, P. ; KRIMER, D.B.; SCHVARTZMAN, J.B.; Simulation of the electrophoretic mobility of supercoiled and catenated DNA molecules . In: 3rd Conference of Computational Interdisciplinary Sciences, 2014 San Lorenzo, Paraguay Proceedings of the 3rd Conference of Computational Interdisciplinary Sciences. 2014.
29. Gonzalez, D. R. ; SHIN, H. H.; C.E. Schaerer; Numerical simulation of plane mixing layer with exothermic chemical reaction using FEniCS libraries. In: 3rd Conference of Computational Interdisciplinary Sciences, 2014 San Lorenzo, Paraguay. Proceedings of the 3rd Conference of Computational Interdisciplinary Sciences. 2014.
30. CACERES SILVA, J. J. ; BARA N, B.; C.E. Schaerer; Parallel-in-time Parareal implementation using PETSc. In: Conferencia Latinoamericana de Informatica - CLEI, 2014 Montevideo, Uruguay. 15-19 Sep XL Latin American Computing Conference (CLEI), 2014. 2014.
31. C.E. Schaerer; P. TORRES; BHAYA, A.; On Improving The Block Variable Conjugate Gradient Algorithm. In: Pan-American Workshop 2014, 2014 Barranquilla - Colombia Proceedings of the Pan-American Workshop 2014. 2014.
32. C.E. Schaerer; P. TORRES; BHAYA, A.; On Improving The Block Variable Conjugate Gradient



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

- Algorithm. In: Pan-American Workshop 2014, 2014 Barranquilla - Colombia Proceedings of the Pan-American Workshop 2014. 2014.
33. J.L.V. NOGUERA; H. L. AYALA; C.E. Schaerer; Morphological reconstruction application for additive and subtractive image color spaces. In: International Congress of Mathematicians, 2014 Coex , Seoul , Korea Proceedings of the ICM. 2014.
34. Rodriguez, L.; Duarte, M. ; Gomez, S. ; C.E. Schaerer; ROJAS DE ARIAS, A. ; Integrated system of data acquisition and monitoring of intra and peridomestic infestation of vector of Chagas disease . In: 3rd Congress of Computational Interdisciplinary Sciences , 2014 San Lorenzo, Paraguay. Proceedings of the 3rd Congress of Computational Interdisciplinary Sciences. 2014.
35. Montania, C. ; Gomez, S. ; C.E. Schaerer; Applying seasonality to a discrete form of the Bass model . In: 3rd Congress of Computational Interdisciplinary Sciences, 2014 San Lorenzo, Paraguay. Proceedings of the 3rd Congress of Computational Interdisciplinary Sciences. 2014.
36. SALGUEIRO, L. ; MONTEIRO, M. ; C.E. Schaerer; Nogues, J.P. ; Sensitivity analysis of a Chromium-Iron redox reaction in a batch system using PHREEQC. In: 3rd Conference of Computational Interdisciplinary Sciences, 2014 San Lorenzo Proceedings of the 3rd Conference of Computational Interdisciplinary Sciences. 2014.
37. CACERES, J.J.; BARA N, B.; C.E. Schaerer; Implementing the Parareal method as a PETSC function. In: 3rd Congress of Computational Interdisciplinary Sciences, 2014 San Lorenzo, Paraguay. Proceedings of the 3rd Congress of Computational Interdisciplinary Sciences. 2014.
38. P. TORRES; C.E. Schaerer; Superlinear convergence for block conjugate gradient using variable block size strategies . In: 3rd Conference of Computational Interdisciplinary Sciences, 2014 San Lorenzo, Paraguay Proceedings of the 3rd Conference of Computational Interdisciplinary Sciences. 2014.
39. Leguizamon, C. ; MONTEIRO, M. ; C.E. Schaerer; Nogues, J.P. ; Application of the Hydrus model to simulate Redox reactions in ZVI filter. In: 3rd Conference of Computational Interdisciplinary Sciences, 2014 San Lorenzo Proceedings of the 3rd Conference of Computational Interdisciplinary Sciences. 2014.
40. MARTINEZ, V.; CEBRIA N, J.; KADOMATSU, J.; Parra, C.; Castan, A.; FERNANDEZ, M.J.; C.E. Schaerer; HERNA NDEZ, P. ; KRIMER, D.B.; SCHVARTZMAN, J.B.; Role of type II topoisomerases in regulation of supercoiling and pre-catenation in replication intermediates of DNA. In: 3rd Conference of Computational Interdisciplinary Sciences, 2014 San Lorenzo, Paraguay. Proceedings of the 3rd Conference of Computational Interdisciplinary Sciences. 2014.
41. Varela, J. ; C.E. Schaerer; Nogues, J.P. ; Two phase flow including capillary pressure and buoyancy effects: a two dimensional model to study the carbon sequestration process . In: 3rd Conference of Computational Interdisciplinary Sciences, 2014 San Lorenzo, Paraguay Proceedings of the 3rd Conference of Computational Interdisciplinary Sciences. 2014.
42. OMayra Ferrero; LICONA, KPM; LUNZ, JN; Magna Monteiro; MARIZE VARELLA; ALEXANDRE A. RIBEIRO; PEREIRA, LC; Synthesis and Characterization of Biphasic Calcium



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

Phosphate Obtained by Sol-Gel Method for bone Regeneration. In: 8vo Congreso Latinoamericano de Organos Artificiales, Biomateriales e Ingenieria de Tejidos, 2014 Rosario, Argentina 8vo COLAOB. 2014.

43. Adolfo Jara; Martin Vera; SILVIA AQUINO; Christian Schaerer; Magna Monteiro; Carlos Juiz; Bartomeu Serra; VEGA, C.; A n t o n i e t a R o j a s d e A r i a s ; Empleo de sensores fotoeléctros infrarrojos para la detección automática de infestación por Triatoma infestans. In: 3rd Conference of Computational Interdisciplinary Sciences, 2014 Asunción CCIS2014. 2014.

2013

1. Fabio López-Pires, Benjamín Barán, "Multi-Objective Virtual Machine Placement with Service Level Agreement. A Memetic Algorithm Approach". 6th ACM/IEEE International Conference on Utility and Cloud Computing (UCC 2013). Dresden, Germany.
2. Fabio López-Pires, "Multi-Objective Virtual Machine Placement". Postgraduate's Thesis Contest. Computer and Telecommunications Conference, International Conference on Technology and Computer Applications (JIT-CITA 2013). Asunción, Paraguay.
3. Fabio López-Pires, Elias Melgarejo, Benjamín Barán, "Virtual Machine Placement. A Multi-Objective Approach". XXXIX Latin American Computing Conference (CLEI 2013). Naiguata, Venezuela.
4. Aditardo Vazquez, Diego Pinto, Enrique Dávalos. "Multicast Optico con protección contra falla de nodo: un enfoque multi-objetivo basado en ACO" Novatica – Revista de la Asociación de Técnicos en Informática (ATI) – España, vol.39, no.226 pp.59-64, ISSN: 02112124, Diciembre 2013 <http://www.ati.es/novatica/2013/226/Nv226-Sumario.pdf>
5. Christian Von Lucken, Alejandro Avalos, Arturo Ferreira, Enrique Dávalos. "Using a cooperative coevolutionary multiobjective algorithm to train Radial Basis Function Neural Networks". EURO 2013, 26th European Conference on Operational Research. Roma, Italia. 2013
6. María Melian, Francisco Mendoza, Enrique Dávalos, Christian Von Lucken. "Stability of p-Cycles in WDM Optical Networks with Dynamic Traffic: A Multi-objective Approach" en XXXIX Conferencia Latinoamericana en Informática (CLEI 2013). Octubre 2013
7. Aditardo Vazquez, Diego Pinto Roa, Enrique Dávalos. "Optical Multicast With Protection Against Node Failure". XXXIX Conferencia Latinoamericana en Informática (CLEI 2013). Octubre 2013
8. José Luis Vázquez Noguera; HORACIO LEGAL-AYALA; C.E. SCHAEERER; ROLON M; Mathematical morphology for counting Trypanosoma cruzi amastigotes. In: CLEI 2013, 2013 Venezuela 2013.
9. F. PISCIO'TTA; A. INVERNIZZI; José Luis Vázquez Noguera; HORACIO LEGAL-AYALA; Mé todo de Segmentació n a Color para Señ ales de Trá nsito de la Repú blica del Paraguay. In: IV Congreso de Matemática Aplicada, Computacional e Industrial, 2013 Autónoma de Buenos Aires 2013.
10. DU, X; SARKIS, M.; C.E. Schaerer; SZYLD, D.B.; (RELEVANTE) Inexact and truncated Parallel in Time Krylov subspace methods for Parabolic Optimal Control Problems, Electronic



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

Transactions on Numerical Analysis, v. 40, p. 36-57, 2013.

11. PREIGSCHADT, R.; MOZZAQUATRO, B.; KOZAKEVICIUS, A.; CERETTA NUNES, R.; CAPPO, C.; C.E. Schaerer; DoS attack detection using a two dimensional wavelet transform, C L E I Electronic Journal, C L E I Electronic Journal, p. 1-8, 2013.
12. BOTTA, R.; BLANCO, G. ; C.E. Schaerer; Juegos evolutivos y evolucion de la cooperacion. In: Conferencia Latinoamericana en Informatica , 2013 Naigata, Vargas, Venezuela Proceedings of CLEI 2013. 2013.
13. J.L.V. NOGUERA; H. L. AYALA; C.E. Schaerer; M. ROLON; Recuento de anmastigotes de Trypanosoma Cruzi usando morfologia matematica. In: Conferencia Latinoamericana en Informatica , 2013 Naigata, Vargas, Venezuela Proceedings of CLEI 2013. 2013.
14. SHIN, H. H.; C.E. Schaerer; PORTELA, L.; MANGIAVACCHI N.; Direct Numerical Simulation Study of Two-Fluid Models in Suspended Sediment Transport. In: 8th International Conference on Multiphase Flow ICMF 2013, 2013 Jeju - Korea 8th International Conference on Multiphase Flow ICMF 2013. 2013.
15. BOGADO, C.; CAUSARANO, W. ; C.E. Schaerer; DELGADO, F. ; MODELO Y TE C N I C A S P A R A E L A N A LISIS DE LA FERRORESONANCIA EN TRANSFORMADORES. In: ERIAC 2013 - CIGRE, 2013 Foz do Iguacu Proceedings of the ERIAC 2013. 2013.
16. BOGADO, C.; CAUSARANO, W. ; C.E. Schaerer; DELGADO, F. ; MODELO Y TE C N I C A S P A R A E L A N A LISIS DE LA FERRORESONANCIA EN TRANSFORMADORES. In: ERIAC 2013 - CIGRE, 2013 Foz do Iguacu Proceedings of the ERIAC 2013. 2013.
17. CEBRIA N, J.; C.E. Schaerer; MARTINEZ, V.; FERNANDEZ, M.J.; HERNA NDEZ, P.; KRIMER, D.B.; SCHVARTZMAN, J.B.; DNA dynamics during replication: the benefit of entanglement. In: Entanglement in biology; how nature controls the topology of proteins and DNA, 2013 2013.
18. CEBRIA N, J.; MARTINEZ, V.; FERNA NDEZ-NESTOSA, M.J.; C.E. Schaerer; HERNA NDEZ, P. ; KRIMER, D.B.; SCHVARTZMAN, J.B.; GEOMETRY AND PLASTICITY OF DNA DURING REPLICATION: THE BENEFIT OF DNA ENTANGLEMENTS. In: 23rd Wilhelm Bernhard Workshop on the Cell Nucleus, 19th August 2013 - 23rd August 2013, 2013 Debrecen-Hungary Proceedings of the 23rd Wilhelm Bernhard Workshop on the Cell Nucleus. 2013.
19. CEBRIA N, J.; MARTINEZ, V.; FERNANDEZ, M.J.; C.E. Schaerer; HERNA NDEZ, P. ; KRIMER, D.B.; SCHVARTZMAN, J.B.; ENTAGLEMENTS IN BIOLOGY; HOW NATURE CONTROLS THE TOPOLOGY OF PROTEINS AND DNA. In: Banff International Research Station, 2013 Banff 2013.

2012

1. Alejandro Talia, Gabriel Villalba, Enrique Dávalos, Diego Pinto. “La selección óptima de los p-ciclos en redes ópticas WDM con restaurabilidad Grupo de Riesgo Compartido Enlace Independiente usando el algoritmo genético”. Revista de la Sociedad Científica del Paraguay, Tercera Época, Año XVII, Vol.17, Nro 1, ISBN 0379-9123, Junio 2012



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

2. Alejandro Talia, Gabriel Villalba, Enrique Dávalos, Diego Pinto. "Optimal Selection of p-cycles on WDM Optical Networks with Shared Risk Link Group Independent Restorability using Genetic Algorithm," Latin America Transactions, IEEE (Revista IEEE America Latina), vol.10, no.1, pp. 1385,1390, ISSN: 1548-0992, January 2012 doi: 10.1109/TLA.2012.6142488
3. Enrique Dávalos, Benjamín Barán, Diego Pinto Roa. "Revisión de Métodos de Protección de Redes Ópticas WDM con Tráfico Dinámico". XVI Latin-Ibero-American Conference on Operations Research, CLAIO 2012. Rio de Janeiro, Brasil. Septiembre 2012.
4. Manuel Godoy, Arturo Ferreira, Christian Von Lucken, Enrique Dávalos, "Radial Basis Neural Network design using a competitive cooperative co-evolutionary multiobjective algorithm," Informatica (CLEI), 2012 XXXVIII Conferencia Latinoamericana En , vol., no., pp.1,9, 1-5 Octubre 2012 doi: 10.1109/CLEI.2012.6427171.
5. Fabio López-Pires, Benjamín Barán, "Taxonomy of Optimal Virtual Machine Placement in Efficient Datacenters". IEEE Conference on Electro-Electronic Engineering, Communications and Computation (ARANDUCON 2012). Asunción, Paraguay.
6. José Luis Vázquez Noguera; HORACIO LEGAL-AYALA; C.E. SCHAEERER; ROLON M; Rgb Color Space Segmentation For Trypanosoma Cruzi Amastigotes: Detection And Accounting. In: CNMAC 2012 - 34º Congresso Nacional de Matemática Aplicada e Computacional., 2012 Águas de Lindóia 2012.
7. Omayra Ferreira; Fatima Yubero; Roseli Balestra; Marize Varella; Magna Monteiro. Bovine Bone Processing for Biofilter Application, Materials Science Forum, Materials Science Forum, v. 727-72, p. 727-730, 2012.
8. CLAUDIO BARUA; JOSÉ MURA; ANIBAL DEL OSRÍOS; Magna Monteiro; ARTROPLASTIAS TOTALES DE CADERA EM EL INSTITUTO DE PREVISIÓN SOCIAL DEL PARAGUAY, 2006-2010, Sociedad Científica del Paraguay (SCP), Sociedad Científica del Paraguay (SCP), v. 16, p. 175-187, 2012. ISSN/ISBN: 0379-9123
9. Shirley Duarte, Balestra, R.M.; Nascimento, S; Marize Varella; Magna Monteiro; DIFFERENT ROUTES FOR OBTAINING HYDROXYAPATITE BY SOL-GEL. In: 7o. Congresso Latino Americano de Orgaos Artificiais e Biomaterias, 2012 Natal/ Brasil 7o. COLAOB. 2012
10. Silvia Aquino; Vega, C.; Magna Monte; POROUS MATERIAL PROCESSING FOR USE AS RELEASE VEHICLE FOR TRIATOMA INFESTANS ATTRACTANTS. In: 7 Congresso Latino Americano de Orgaos Artificiais e Biomateriais, 2012 Natal/ Brasil 7o. COLAOB. 2012.
11. Shirley Duarte; Balestra, R.M. ; A.C.C. Moreira; Nascimento, S. Marize Varella; Magna Monteiro ; COMPARISON OF SOL-GEL ROUTES FOR SYNTHESIS OF CALCIUM PHOSPHATES. In: Congresso Brasileiro de Engenharia e Ciência dos Materiais, 2012 Joinville 20º CBECIMAT (ISSN 2179- 328X). 2012.

2011

1. Villalba Paez, Jose; Talia, Alejandro; Davalos Gimenez, Enrique; Pinto Roa, Diego. "Optimal



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

- Selection of p-cycles on WDM Optical Networks with Shared Risk Link Group Independent Restorability using Genetic Algorithm" I2TS'2011- 10th International Information and Telecommunication Technologies Conference. Florianopolis, Brasil. Diciembre 2011.
2. Detecção de Ataques Web usando Técnicas de Detecção de Anomalias. Escola Regional de Redes de Computadoras (ERRC 2011). São Leopoldo (RS) Brasil. 2011. Con: Bruno Mozzaquatro(UFSM), Renato Azevedo (UFSM), Raul Ceretta Nunes (UFSM), Alice Kozakevicius (UFSM) y Christian Schaerer (UNA).
 3. An Enhanced MOGWW for the bi-objective Quadratic Assignment Problem. E Gutierrez, C Brizuela. International Journal of Computational Intelligence Systems (IJCIS) 4 (4), 530-549 doi: 10.2991/ijcis.2011.4.4.12
 4. G. Blanco; D. Waniek; F. Olsina; F. Garcés; C. Rehtanz "Flexible Investment Decisions in the European Interconnected Transmission System". Electric Power Systems Research, issue. 81, Abril 2011, pp. 984-994.
 5. G. Blanco, F. Olsina, F. Garcés and C. Rehtanz, "Real Option Valuation of FACTS Investments Based on the Least Square Monte Carlo Method". IEEE Transaction on Power System, issue. 26, 2011, pp. 1389-1398.
 6. G. Blanco and F. Olsina. "Optimal decision-making under uncertainty - application to power transmission investments". Chapter of the book: "Stochastic Optimization, Theory and Applications", v. 1, p. 107-140, ISBN: 978953307829 Ed. IN-TECH International. 2011.
 7. M. Osthues, G. Blanco, C. Rehtanz, "Strategic investments and regulatory framework for distribution system planning under uncertainty", working paper series, 2011.
 8. G. Blanco, F. Olsina, F. Garcés, "Transmission Investments under Uncertainty: the Impact of Flexibility on Decision-Making", working paper series, 2011.
 9. G. Blanco, J. Amatte, E. Riveros, "Energy Prospective Analysis of Paraguay, an energy-environmental model based on scenarios", working paper series, 2011.
 10. C. Ochoa; G. Idarrága; G. Blanco "Modeling Wind Generators for Dynamic Studies in Electric Networks". Revista EIC -Energía, Industria y Construcción, Perú,v. 60, p.29 -31, 2011.
 11. G. Blanco, U. Häger, F. Olsina and C. Rehtanz. "Valuing the Dynamic Power Flow Control of FACTS devices under Uncertainties". IEEE Trondheim POWER TECH 2011. Norway, June 2011.
 12. L. Aguiar and G. Blanco. "Fideicomisos como mecanismo alternativo de inversión en el sistema de transmisión paraguayo". ERIAC 2011. May 2011.
 13. E. Buzarquis, F. Olsina, F. Garcés, and G. Blanco. "Impacto de las inversiones en Generación Distribuida en el perfil de riesgo de portafolios de inversión en la red de distribución" ERIAC 2011. May 2011.
 14. G. Blanco; L. AGUIAR. "Aplicando Teoría de Juegos en negociaciones estratégicas en temas de energía: Caso Itaipú". In: XIV Encuentro Regional Iberoamericano del CIGRE, 2011 Ciudad del



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

Este XIV. Encuentro Regional Iberoamericano del CIGRÉ. 2011. Mayo 2011.

15. C. OCHOA; G. IDARRÁ GA; G. Blanco. "MODELADO DE LA GENERACIÓN EÓLICA PARA ESTUDIOS DINÁMICOS EN REDES ELÉCTRICAS". In: IV Conferencia Internacional Ciencia y Tecnología por un desarrollo sostenible, 2011 Universidad Camagüey, Cuba IV Conferencia Internacional Ciencia y Tecnología por un desarrollo sostenible. 2011.
16. C. OCHOA; G. IDARRÁ GA; G. Blanco. "Dynamic Modeling of a Variable Speed Wind Turbine with DFIG based on MATLAB/SIMULINK". II Workshop on Energy and Environment 2011. Río de Janeiro. Julio 2011.
17. MaríaJoséFernández-Nestosa, MaríaCeleste Vega-Gómez y Andrés Mojoli, Estandarización de una técnica de detección de delecion DF508 del GEN CFTR. Revista de la UNA.
18. Wim Quint, Núria Guimerà, MaríaJoséFernández, Alcides Chaux, Antonio L. Cubilla et al. HPV in subtypes of Penile Intraepithelial Neoplasia (PeIN), squamous hyperplasia and lichen sclerosus: A LCM study. Comunicación en meeting con DDL de Voorburg-Holanda. 2011.
19. FERREIRO, O.B; YUBERO, M.F; BALESTRA, R.M.; OLIVEIRA, M.V; MONTEIRO, M. Bovine Bone Processing for Biofilter Application. In Eighth International Latin American Conference on Powder Technology – PTECH 2011, Costão do Santinho, located in Florianópolis - SC – Brazil. 2011.
20. MOZZAQUATRO, B; CAPPO, C.; KOZAKEVICIUS, A.; CERETTA NUNES, RAUL; Schaerer, C.E., Web Attacks Detection using Anomaly-based Detection Techniques. Journal of Applied Computing Research, v. - p. -, 2011.
21. PREIGSCHADT, R; MOZZAQUATRO, B; CAPPO, C.; CERETTA NUNES, RAUL; Schaerer, C.E.; KOZAKEVICIUS, A. A Bidimensional Wavelet Transform based Algorithm for DoS Attack Detection. In: Latin American Symposium on Dependable Computing - LADC, 2011 Sao Jose dos Campos IEEE . 2011.
22. J.L.V. NOGUERA; H. LEGAL; AYALA; M. ROLON; C.E. Schaerer, Recuento de amastigotes de Trypanosoma cruzi y Leishmania sp por procesamiento computacional de imágenes microscópicas. In: CMAC-SE-2011-Congresso de Matemática Aplicada e Computacional, 2011 Uberlândia . 2011.
23. Sebastian Grillo, Gerardo Blanco; Christian E. Schaerer, Real options using a jump process approximation. In: 15th Annual International Conference, 2011 Turku, Finland Real options using a jump process approximation. 2011. Palabras Clave: Real Option; European Option; American Option. Áreas del conocimiento: Ciencias Naturales / Ciencias de la Computación e Información/ Ciencias de la Computación/Decisión Making.
24. Cesar Bogado, Walter Causarano, C. E. Schaerer, Bifurcacion ferroresonante por la saturación magnética, CMAC - SE 2011 - Congresso de Matemática Aplicada e Computacional 20 a 23 de septiembre de 2011, Uberlandia - Brasil
25. Eduardo A. De Los Santos, Juan E. Gavilan, Miki Saito, C. E. Schaerer, On the Parareal method for the Wave Equation, CMAC - SE 2011 - Congresso de Matemática Aplicada e Computacional 20 a 23 de septiembre de 2011, Uberlandia –



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

26. Baran, B.; Pinto-Roa, D. y Brizuela, C.; “Routing and wavelength converter allocation in WDM networks: a multi-objective evolutionary optimization approach”, con . Photonic Network Communications. Volumen 22, Número 1, pg. 23-45. Springer. Agosto 2011.
27. Baran, B.; Hüttemann, G.; Ricart J. y Lima J., “Propuestas Multiobjetivas de la Metaheurística Harmony Search”, XXXVII Conferencia Latinoamericana de Informática, CLEI’2011. Quito – Ecuador. Seleccionado como uno de los mejores artículos, es republicado en revista Electronic Notes in Theoretical Computer Science (ENTCS) con el nombre “Multiobjective Harmony Search Algorithm Proposals”. 2011
28. Baran, B.; Caniza, H. y Wich, A. “A Cooperative game for Distributed Wavelength Assignment in WDM Networks”. IARIA Third International Conference on Evolving Internet – INTERNET 2011. Luxemburgo.
29. W. VILLAMAYOR ; H. LEGAL AYALA; C.E. Schaerer Contour - point signature: a new descriptor for matching rigid shapes with a single closed contour. In: Congresso de Matematica Aplicada e Computacional - CMAC 2011, 2011. Uberlandia Brasil. 2011.
30. Monges, M.; Legal Ayala, H; Stavis, S. Detección automática de células con micronúcleos por etiquetación de componentes, CMAC - SE 2011 - Congresso de Matemática Aplicada e Computacional 20 a 23 de septiembre de 2011, Uberlandia - Brasil
31. Lopez, F; Legal Ayala, H. Coronary Artery Segmentation in CTA Using the Distance, CMAC - SE 2011 - Congresso de Matemática Aplicada e Computacional 20 a 23 de septiembre de 2011, Uberlandia – Brasil.

2010

32. 2010 “Multiobjective energy purchase strategy with an evolutionary algorithm”, con P. Gardel y H. Checo. SPRINGER Computational Optimization and Applications. ISSN: 0926-6003.
33. “Reconfiguración de Tráfico Dinámico en Redes Ópticas WDM: Un enfoque basado en Algoritmos de Colonia de Hormigas”, con E. Dávalos y D. Pinto. XXXVI Conferencia Latinoamericana de Informática, CLEI’2010. Asunción – Paraguay.
34. “Evolución de Reglas de Clasificación Binaria utilizando Programación Genética Lineal. Una Aplicación al Descarte de Ganado”, con M. Abente y J. Martínez. XXXVI Conferencia Latinoamericana de Informática, CLEI’2010. Asunción – Paraguay.
35. “Metodología para el Monitoreo Efectivo de las Variaciones de Tensión de Corta Duración en Sistemas Eléctricos de Potencia”, con J. Campuzano, L. Salinas, P. Gardel y E. Dávalos. Congreso Internacional de Distribución de Energía Eléctrica - CIDEL’2010, Bs. Aires – Argentina.
36. “Routing in Periodic Dynamic Networks using a Multi-Objective Evolutionary Algorithm”, con U. Yael. ALIO/INFORMS 2010. Bs. Aires - Argentina.
37. “Optical Multicast Protection with Multi-objective Evolutionary Algorithm”, con D. Pinto y R. Lugo. ALIO/INFORMS 2010. Bs. Aires - Argentina.



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

38. MATHEW T.; SARKIS, M.; C.E. Schaerer, Analysis of block parareal preconditioners for parabolic control problems. SIAM Journal on Scientific Computing, v. 32 , p. 1180-1200, 2010.
39. SHIN, H. H.; PORTELA, L.; C.E. Schaerer Transporte de Sedimentos Suspendidos: Herramienta de Simulación usando Computación Científica. In: Primer Congreso Paraguayo sobre Medio Ambiente y Desarrollo Sostenible y Novena Jornada de Biología del Paraguay, 2010 Asunción, Paraguay . 2010.
40. SHIN, H. H.; MANGIAVACCHI N.; PORTELA, L.; C.E. Schaerer Numerical simulation of suspended sediment transport using finite elements: A comparison between Euler-Euler and Euler-Lagrange approaches.. In: 2nd Brazilian Meeting on Boiling, Condensation, and Multiphase Flows, 2010 São Carlos, May 3-4, Brasil Anais do Encontro Brasileiro de Escoamento Multifásico. 2010.
41. C.E. Schaerer, Control theoretical formulation for the Helmholtz Scattering Problem. In: II Congresso de Matemática e suas Aplicações, 2010 Curitiba, Paraguay Anais do 1st Conference on Computational Interdisciplinary Sciences. 2010.
42. C.E. Schaerer, Block Preconditioners for Parabolic Optimal Control Problems. In: 1st Conference of Computational Interdisciplinary Sciences – CCIS, 2010 São José dos Campos-SP, Brazil . 2010.
43. C.E. Schaerer, Block parareal preconditioner for parabolic optimal control problems. In: CIMPA SCHOOL: Applied Mathematics and Engineering CIMPA - INGEMAT-2010, 2010 Montevideo, Uruguay . 2010.
44. ORTIZ, I.; C.E. Schaerer Helmholtz Scattering Problem: Control Theoretical Perspective. In: Workshop on Computational and Applied Mathematics for Engineering, WAMCE 2010, 2010 San Lorenzo, Paraguay . 2010.
45. FLEITAS F, JUAN R.; STALDER D., D. H.; C.E. Schaerer Optimal Boundary control parareal algorithm for cooling electronics circuits. In: Workshop on Computational and Applied Mathematics for Engineering, WAMCE 2010, 2010 San Lorenzo, Paraguay . 2010.
46. GARAY, J.; COLBES, C.; C.E. Schaerer Advances in numerical methods for two-phase flow with hysteresis. In: Workshop on Computational and Applied Mathematics for Engineering, WAMCE 2010, 2010. San Lorenzo, Paraguay. 2010.
47. MENDEZ, C.; C.E. Schaerer; VELAZQUEZ, E. Modelling and simulation of interaction between reverse osmosis process and aquifer which receives to rejection. In: Workshop on Computational and Applied Mathematics for Engineering, WAMCE 2010, 2010 San Lorenzo, Paraguay . 2010.
48. SHIN, H. H.; MANGIAVACCHI N.; PORTELA, L.; C.E. Schaerer Suspended Sediment Transport Simulation: Initial Results of Multiphase Flows Models in Open Channel Flow. In: Workshop on Computational and Applied Mathematics for Engineering, 2010 San Lorenzo - Paraguay . 2010.
49. CUEVAS, ROLANDO; C.E. Schaerer; BHAYA, A. A proportional derivative control strategy for varying the restart parameter in GMRES(m). . In: CNMAC-2010, 2010 Aguas de Lindoia-SP, Brasil Anais do CNMAC . 2010.



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

2009

1. CAPPO, C.; CERETTA NUNES, R.; C.E. Schaerer On using wavelets for detecting attacks to web-based applications. In: XXXII Congreso Nacional de Matemática Aplicada y Computacional, 2009. Mato Grosso - Cuiabá, Brasil Sociedad Brasileira de Matemática Aplicada y Computacional, SBMAC-UFMT (Universidade Federal de Mato Grosso - Cuiabá), 2009.
2. GALEANO, C. A.; POLETTI, M.J; FELICIANGELI, H.; C.E. Schaerer Robin optimal boundary control for cooling electronic circuits. In: XXXII Congreso Nacional de Matemática Aplicada y Computacional, 2009 Mato Grosso - Cuiabá, Brasil Sociedad Brasileira de Matemática Aplicada y Computacional, SBMAC-UFMT (Universidade Federal de), Anais do CNMAC 2009. 2009.
3. CAPPO, C.; C.E. Schaerer Detección de intrusión por anomalía en aplicaciones web: estado del arte. In: Workshop en Energía y Medio Ambiente, 2009 San Lorenzo, Paraguay . 2009.
4. C.E. Schaerer; GALEANO, C. A.; POLETTI, M.J Cooling electronic circuits: three dimensional simulation and control. In: Workshop en Energía y Medio Ambiente, 2009 San Lorenzo, Paraguay . 2009.
5. GONZÁ LEZ A., G. A.; C.E. Schaerer Aproximación de Galerkin estabilizado vía funciones de Lyapunov. In: Workshop en Energía y Medio Ambiente, 2009 San Lorenzo, Paraguay. 2009.
6. ORTIZ, I.; C.E. Schaerer Formulación de control para dispersión de ondas bidimensionales planas. In: Workshop en Energía y Medio Ambiente, 2009 San Lorenzo, Paraguay . 2009.
7. SAUER, C.; FELICIANGELI, H.; C.E. Schaerer Cooling bidimensional electronic circuits: simulation and control. In: Workshop en Energía y Medio Ambiente, 2009 San Lorenzo, Paraguay . 2009.
8. GONZÁ LEZ A., G. A.; C.E. Schaerer Estabilização do método de elementos finitos para a equação de convecção-difusão via funções de Lyapunov. In: XXXII Congreso Nacional de Matemática Aplicada y Computacional-CNMAC, 2009. Mato Grosso - Cuiabá, Brasil Anais do CNMAC 2009.
9. 2009. A Comparison of Genetic Algorithms, Particle Swarm Optimization and Differential Evolution Method for the Design of Scannable Circular Antenna Arrays. M. A. Panduro, C.A. Brizuela, L. I. Balderas and D. A. Acosta. Progress In Electromagnetics Research B, Vol. 13, 171 – 186.
10. 2009. Analysis of block parareal preconditioners for parabolic control problems. T. B. Mathew, M. Sarkis and C. Schaerer, SIAM SISC, 2009.
11. 2009. Influence of Processing on Mechanical Properties of Hydroxyapatite. M. V. Oliveira, M. Monteiro, R. P. Pereira; I. M. Caminha, S. R. A. Santos, A. Rossi. Key Engineering Materials, 2009.
12. 2009. M. Duarte (en colaboración con M. Massot, S. Descombes, T. Dumont, V. Louvet y F. Laurent), 'New algorithms for multi-scale reaction waves simulation', Conferencia de Calculo Científico en honor a E. Hairer, 17-20 Junio 2009. Ginebra, Suiza.



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

13. 2009. M. Duarte (en colaboración con M. Massot, S. Descombes, T. Dumont, V. Louvet y F. Laurent), 'Nouveaux algorithmes pour la simulation d'ondes de réaction multi-échelles impliquant des mécanismes complexes', SMAI 2009, 4to Bienal Francés de Matemáticas Aplicadas e Industriales, 25-29 Mayo 2009. La Colle sur Loup, Francia.
14. 2009 "Ubicación óptima de Conversores de Longitud de Onda: una nueva propuesta multi-objetivo", con M. Sobrino, R. Maciel y D. Pinto. Revista de la Sociedad Científica del Paraguay N° 25. ISBN 99925-862-3-0.
15. 2009 "Programación Lineal Entera para Reconfiguración de Redes Ópticas", con E. Dávalos y D. Pinto. Revista de la Sociedad Científica del Paraguay N° 26. ISBN 99925-862-3-0.
16. 2009 "Minimal Disruption-Reconfiguration problem over WDM Optical Networks", con D. Pinto y E. Dávalos. 8th International Information and Telecommunication Technologies Symposium - IZTS'2009. Florianópolis, Santa Catarina - Brasil.
17. 2009 "Wavelength Converter Allocation in Optical Networks: An Evolutionary Multi-Objective Optimization Approach", con D. Pinto y C. Brizuela. 9th International Conference on Intelligent Systems Design and Applications - ISDA'09. Pisa, Italia.
18. 2009 "Optimal Wavelength Converter Allocation: A New Approach Based MOEA", con R. Maciel, M. Sobrino, D. Pinto y C. Brizuela. 5th IFIP/ACM Latin-American Networking Conf. - LANC 2009. Pelotas, Brasil.
19. 2009 "Una nueva propuesta de Templado Simulado Multiobjetivo", con H. Meyer. XXXV Conferencia Latinoamericana de Informática, CLEI'2009. Pelotas, RS – Brasil.
20. 2009 "Estrategia Multiobjetiva de Compra de Energía y Potencia en el Sistema Eléctrico Paraguayo", con P. Gardel y H. Checo. VIII Congreso Chileno de Investigación Operativa, OPTIMA 2009. Termas de Chillan – Chile.
21. 2009 "Optimizing p-Cycles Selection with MOEAs approach to protect WDM Optical Networks", con C. Colmán y D. Pinto. 24th IFIP TC7 Conference on System Modeling and Optimization. Bs. Aires – Argentina.
22. 2009 Multiobjective energy purchase strategy with an evolutionary algorithm", con H. Checo y P. Gardel. 24th IFIP TC7 Conference on System Modeling and Optimization. Bs. Aires – Argentina.

2008

1. 2008. Etereldes Goncalves, Tarek P. Mathew, Marcus Sarkis and Christian E. Schaerer, A Robust preconditioner for the Hessian system in elliptic optimal control problems, in Domain Decomposition Methods in Science and Engineering XVII, Ulrich Langer et al. (eds.), vol. 60 of Lecture Notes in Computational Science and Engineering, Springer-Verlag, 2008, pp. 527-534.
2. 2008. Tarek P. Mathew, Marcus Sarkis and Christian E. Schaerer, Block diagonal parareal preconditioner for parabolic optimal control problems, in Domain Decomposition Methods in



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

- Science and Engineering XVII, Ulrich Langer et al. (eds.), vol. 60 of Lecture Notes in Computational Science and Engineering, Springer-Verlag, 2008, pp 409-416. Bibtex
3. 2008. Postal Envelope Segmentation using Learning-Based Approach. H. Legal-Ayala, J. Facon, B. Baran. CLEI - Electronic Journal, Vol. 11 Num. 2 Pap. 2.
 4. 2008. Numerical Analysis of Metal Powders in Uniaxial Compaction. M. Monteiro, D. Roehl, J. Silveira. Materials Science Forum, v. 591-59, p. 218-222, 2008.
 5. 2008 "Macro-Economic Time-Series Forecasting Using Linear Genetic Programming", con R. Sánchez y J. Martínez. Computational Intelligence in Economics and Finance - CIEF. 11th Joint Conference on Information Sciences JCIS'2008. Kylin Villa – Shenzhen, China.
 6. 2008 "MASTERGOAL: an interesting testbed for AI techniques", con A. Samaniego y A. Alliana. GAME-ON'2008, organizado por EUROSIS (European Simulation Society). Valencia, España.
 7. 2008 "Team Algorithms based on Ant Colony Optimization. A new Multi-Objective Optimization approach", con D. Pinto y C. Lezcano. 10th International Conference on Parallel Problem Solving From Nature - PPSN'2008. Alemania
 8. 2008 "Multiobjective allocation of remotely controlled switches in an electric distribution power system", con A. Villasanti y P. Gardel. IEEE PES Transmission and Distribution Conference - Latin America. Bogotá- Colombia.
 9. 2008 "Selección Óptima de p-Cycle en Redes WDM. Un enfoque basado en MOEA", con C. Colmán y D. Pinto. Congreso Colombiano de Comunicaciones IEEE – COLCOM'2008. Popayán - Colombia.
 10. 2008 "Solving Multi-Objective p-Cycle Protection Problem in WDM Optical Networks with an Evolutionary Algorithm approach", con C. Colmán y D. Pinto. 7th International Information and Telecommunication Technologies Symposium IEEE – I2TS'2008. Foz do Iguaçu, Paraná- Brasil.
 11. 2008 "Optimización por Enjambre de Partículas para Satisfacción de Fórmulas Booleanas", con V. Gonzalez y M. Villagra. XXXIV Conferencia Latinoamericana de Informática – CLEI'2008. Santa Fe - Argentina.
 12. 2008 "Algoritmos Evolutivos en la Optimización de Funciones de Evaluación del Juego Mastergoal", con A. Samaniego. XXXIV Conferencia Latinoamericana de Informática – CLEI'2008. Santa Fe - Argentina.
 13. 2008 "Generación de modelos de estimación utilizando Programación Genética Lineal", con J. Martínez y R. Sánchez. XXXIV Conferencia Latinoamericana de Informática – CLEI'2008. Santa Fe - Argentina.
 14. 2008 "Selección Óptima de p-Cycle en Redes WDM. Un enfoque basado en Algoritmo Genético", con C. Colmán y D. Pinto. XXXIV Conferencia Latinoamericana de Informática – CLEI'2008. Santa Fe - Argentina.
 15. 2008 "Equipo de Algoritmos de Hormigas. Una nueva propuesta para Optimización



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

Multiobjetivo”, con C. Lezcano y D. Pinto. XXXIV Conferencia Latinoamericana de Informática – CLEI’2008. Santa Fe - Argentina.

16. 2008 “Pronóstico de Series de Tiempo utilizando Programación Genética Lineal ”, con R. Sánchez y J. Martínez. Revista de la Sociedad Científica del Paraguay N° 23. ISBN 99925-862-3-0.

2007

1. 2007. Christian E. Schaerer, Tarek Mathew and Marcus Sarkis, Temporal domain decomposition for a linear quadratic optimal control problems , High Performance Computing for Computational Sciences-VECPAR2006, Lecture Notes in Computer Sciences , volume 4395, 2007, pp. 452-465.
2. 2007. Analysis of block preconditioners for elliptic optimal control problems, T. Mathew, M. Sarkis and C.E. Schaerer Numerical Linear Algebra with Applications. 14: 257-279. DOI: 10.1002/nla.256.
3. 2007 Ant Colony Optimization with Adaptive Fitness Function for Satisfiability Testing, con M. Villagra. Fourteenth Workshop on Logic, Language, Information and Computation – WoLLIC’2007. Rio de Janeiro – Brasil.
4. 2007 A Global Convexity Analysis on the MAX-SAT Domain, con M. Villagra. 2nd International Conference on Bio-Inspired Models of Network, Information, and Computing Systems - BIONETICS 2007. Budapest – Hungría.
5. 2007 Asynchronous Team Algorithms for Boolean Satisfiability, con C. Rodríguez y M. Villagra. 2nd International Conference on Bio-Inspired Models of Network, Information, and Computing Systems - BIONETICS 2007. Budapest – Hungría.
6. 2007 Routing and Wavelength Assignment over WDM Optical Networks. A Comparison between MOACOs and Classical approaches, con A. Arteta y D. Pinto. IFIP/ACM Latin-American Networking Conference – LANC’2007. San José de Costa Rica. Premio Chevron.
7. 2007 Optimización multiobjetiva del diseño de redes de distribución de agua utilizando Algoritmo Evolutivo, con M. Duarte, D. Alviso y P. Gardel. XXXIII Conferencia Latinoamericana de Informática – CLEI’2007. San José de Costa Rica.
8. 2007 Ubicación óptima de llaves telecomandadas en un sistema de distribución eléctrica utilizando un Algoritmo Evolutivo Multiobjetivo, con A. Villasanti y P. Gardel. XXXIII Conferencia Latinoamericana de Informática – CLEI’2007. San José de Costa Rica.
9. 2007 Equipo de Algoritmos Meméticos con Adaptación Multinivel para Optimización Multiobjetivo, con M. Báez y D. Zárate. Revista de la Sociedad Científica del Paraguay. Tercera época – Año XI, N° 22. Asunción - Paraguay. ISSN 0379-9123.
10. 2007 “Learning-Based Approach for Postal Envelope Address Block Segmentation”, con H. Legal y J. Facon. XXXIII Conferencia Latinoamericana de Informática – CLEI’2007. San José de Costa Rica.



SOCIEDAD MATEMATICA PARAGUAYA

Dr. César López Moreira 693 entre Migone y Nstra. Sra del Carmen
Barrio Las Carmelitas, Asunción – Paraguay

11. 2007 “Algoritmos Meméticos Adaptativos para Optimización Multi-Objetivo”, con M. Báez y D. Zárate. XXXIII Conferencia Latinoamericana de Informática – CLEI’2007. San José de Costa Rica.
12. 2007 “Asignación Óptima de Lightpath bajo requerimientos de QoS. Un enfoque multiobjetivo basado en MOEAs”, con C. Núñez y D. Pinto. XXXIII Conferencia Latinoamericana de Informática – CLEI’2007. San José de Costa Rica.
13. 2007 “Asynchronous Team Algorithms”, con M. Villagra. Conference of the Israeli Operations Research Society – ORSIS’2007, sponsored by the Hebrew University of Jerusalem and IBM Research. Jerusalén – Israel.
14. 2007 “Ómicron SAT: Un algoritmo de Colonia de Hormigas para el problema de Satisfacción Booleana”, con M. Villagra. Revista de la Sociedad Científica del Paraguay. Tercera época – Año XI, N° 21. Asunción - Paraguay.

2006

1. 2006. Christian E. Schaerer, Marcus Sarkis, Dan Marchesin e Pavel Bedrikovetsky, “Counterflow segregation problem with hysteretic permeability”, SIAM Journal of Applied Mathematics. SIAP Volume 66, Issue 5, Pages 1512-1532.
2. 2006. Optimización de Enjambre de Partículas aplicada al Problema del Cajero Viajante Bi-objetivo”, B. Barán y J. Lima. ASAI, Revista Iberoamericana de Inteligencia Artificial, edit. Asoc. Española para la Intel. Art. AEPIA.

2005

1. 2005. Multi-objective pump scheduling optimization using evolutionary strategies, B. Barán, C. von Lücken y A. Sotelo. Special Issues of Computers & Structures. Advances in Engineering Software Journal. Elsevier. 2005.

2004

1. 2004. Christian E. Schaerer, Eugenius Kaszkurewicz e Norberto Mangiavacchi, “A Multilevel Schwarz Shooting Method for the solution of the Poisson Equation in Two Dimensional Incompressible Flow Simulations”, Applied Mathematics and Computation, Volume 153, Issue 3, 14, pp. 803-831.