FOZ2018

PROGRAM

Warning: The abstracts of Monday (23) are available! You can see by clicking in the names.

Monday - July, 23

	Room Africa + Europe
08:00h	FOZ 2018 - ICM Sattelite Event Opening Session

	Room Africa + Europe
	Chair: Clóvis Gonzaga
08:30h	Alfredo Iusem
09:15h	Sandra Augusta Santos
10:00h	Coffee-Break and BRAZILOPT Poster Session

	Room Africa + Europe		Room Oceania
	Chair: Ernesto Birgin		Chair: José Cuminato
10:30h	José Mario Martinez	10:30h	Felipe Pereira
11:15h	Clóvis Caesar Gonzaga	11:15h	Jorge Lira
12:00h	Lunch		

	Room Asia	Room Americas		Room Oceania	Room Mercosul
	Chair: Hugo Scolnik	Chair: Douglas S. Gonçalves		Chair: Justin Wan	Chair: Felipe Pereira
13:50h	Konstantin Khanin	Abel S. Siqueira	14:00h	Jiangong You	V.A. Vassiliev
14:15h	Joaquim Judice	John L. Gardenghi			
14:40h	Roberto Andreani	Graciela N. Sottosanto	14:45h	Qi-Man Shao	Weldon Lodwick
15:05h	Hugo Scolnik	Douglas S. Gonçalves			
15:30h	Coffee-Break and BRAZILOPT Poster Session				

	Room Africa + Europe		Room Oceania	Room Mercosul
	Chair: Alfredo Iusem		Chair: Pedro D. Damazio	Chair: Fernando Ávila
16:00h	Benar F. Svaiter	16:00h	Mary Durojaye	Erick Moya
		16:20h	Chao Wu	Maria Rojas
		16:40h	André Jacomel Torii	Camille Poignard
16:45h	Paulo J. S. Silva	17:00h	Akhlaq Husain	Mariana Kleina
		17:20h	Pedro D. Damazio	Fernando Ávila

	Room Oceania		Room Mercosul
	Chair: Neela Nataraj		Chair: Weldon Lodwick
17:45h	Alexandre Madureira	17:45h	Jacek Banasiak

Communication Session · Plenary Session · Special Session · Break

Warning: The abstracts of Tuesday (24) are available! You can see by clicking in the names.

Tuesday - July, 24

	Room Asia	Room Americas		Room Oceania	Room Mercosul
	Chair: Ademir A. Ribeiro	Chair: Hugo Lara Urdaneta		Chair: Messias Meneguetti	Chair: Cassio Oishi
08:20h	Damián Fernández	Gilson do N. Silva	08:20h	Mythily Ramaswamy	Ting Wei
			08:40h	Ya-Feng Liu	Elias Gudiño
08:45h	Ellen H. Fukuda	Mauricio Romero Sicre	09:00h	Jian-Hua Wu	Manuel Silvino
09:10h	Juliano de B. Francisco	Joao Xavier da C. Neto	09:20h	Silas Abahia	Shuanping Du
09:35h	Ademir A. Ribeiro	Hugo Lara Urdaneta	09:40h	Messias Meneguetti	Cassio Oishi
10:00h	Coffee-Break and Ind Math and BRICS Poster Session				
	Room Africa + Europe			Room Oceania	Room Mercosul
	Chair: Geovani Grapiglia			Chair: Ya-Xiang Yuan	Chair: Li Weigang
10:30h	Yaxiang Yuan		10:30h	Pingwen Zhang	V.I. Lotov
11:15h	Mikhail Solodov		11:15h	Qiang Du	José Alberto Cuminato
12:00h	Lunch				
	Room Asia	Room Americas		Room Oceania	Room Mercosul
	Chair: Juan Pablo Luna	Chair: Marc Lassonde		Chair: Jorge Lira	Chair: Romes A. Borges
13:50h	Shuai Liu	Fernanda Raupp	14:00h	Tiago Pereira	S. Lubbe
14:15h	Jefferson G. Melo	Felipe Lara			
14:40h	Geovani N. Grapiglia	Marc Lassonde	14:45h	Jonathan D. Evans	Domingos Alves Rade
15:05h	Juan Pablo Luna				
15:30h	Coffee-Break and Ind Math and BRICS Poster Session				
	Room Africa + Europe			Room Oceania	Room Mercosul
	Chair: Sandra A. Santos			Chair: Song Liu	Chair: XiangYun Zhang
16:00h	Philippe Toint		16:00h	Vinicius Albani	Huang Zhengda
			16:20h	Rawlilson O. Araújo	Benito Pires
16:45h	Yu-Hong Dai		16:40h	Shuqin Wang	Yu Chen
			17:00h	Carlos E. Andrade	Xiaodong Zhang
			17:20h	Song Liu	XiangYun Zhang
	Room Oceania			Room Mercosul	
	Chair: Ma To Fu			Chair: Domingos A. Rade	
17:45h	Jixiang Fu		17:45h	João Luiz Azevedo	
20:00h	Conference Dinner				

Communication Session — Plenary Session — Special Session — Break

Warning: The abstracts of July, 26 are not available yet

Thursday - July, 26

	Room Asia	Room Americas		Room Oceania	Room Mercosul
	Chair: Susana Scheimberg	Chair: Roger Behling		Chair: Elizabeth W. Karas	Chair: José dos Reis
08:20h	Vahid Mohebbi	Melissa W. Mendonça	08:20h	Qiang Li	Stanley Ferreira
			08:40h	Cong Sun	Bruno Barela
08:45h	Pedro Jorge S. Santos	Maicon Marques Alves	09:00h	Luiz Carlos Matioli	Zhaofang Bai
09:10h	Reinier Díaz Millán	José Yunier Bello Cruz	09:20h	Daniela R. Cantane	Jianlong Chen
09:35h	Susana Scheimberg	Roger Behling	09:40h	Elizabeth W. Karas	José dos Reis
10:00h	Coffee-Break and Brazil-China Poster Session				

	Room Africa + Europe		Room Oceania	Room Mercosul
	Chair: Claudia Sagastizábal		Chair: Jixiang Fu	Chair: Natasa Krejic
10:30h	Mirjam Djur	10:30h	Marco Prate	Justin Wan
11:15h	Ernesto Birgin	11:15h	S. Kesavan	Luis Gustavo Nonato
12:00h	Lunch			

	Room Asia	Room Americas		Room Oceania	Room Mercosul
	Chair: María Cristina Maciel	Chair: Gabriel Haeser		Chair: Amiya Pani	Chair: Esdras P. Carvalho
13:50h	Ana Paula Chorobura	Leonardo D. Secchin	14:00h	Dipndra Prasad	Eban Mare
14:15h	Lauren K. S. Gonçalves	Luís Felipe Bueno			
14:40h	Maria de G. Mendonça	Alberto Ramos	14:45h	Ma To Fu	Mauro A. Ravagnani
15:05h	María Cristina Maciel	Gabriel Haeser			
15:30h	Coffee-Break and Brazil-China Poster Session				

	Room Africa + Europe		Room Oceania	Room Mercosul
	Chair: Paulo J. S. Silva		Chair: Roberto Ribeiro S. Jr	Chair: Aleksandr A. Shananin
16:00h	Peter Richtarik	16:00h	Nanqing Ding	Jairo Rocha de Faria
		16:20h	Paulo N. S. Huertas	Felix Sadyrbaev
		16:40h	Hengling Hong	Flaviana M. Souza
16:45h	Claudia Sagastizábal	17:00h	Thelma P. B. Vecchi	Geraldo Brito Junior
		17:20h	Roberto Ribeiro S. Jr	Aleksandr A. Shananin

	Room Oceania		Room Mercosul
	Chair: Jacek Banasiak		Chair: Guoliang Chen
17:45h	Andrey Vesnin	17:45h	Weiguo Wu

Communication Session | Plenary Session | Special Session | Break

Warning: The abstracts of July, 27 are not available yet

Friday - July, 27

	Room Asia	Room Americas		Room Oceania
	Chair: Max L. N. Gonçalves	Chair: Leandro Prudente		Chair: Paulo F. A. Mancera
08:20h	Mael Sachine	Paulo S. M. dos Santos	08:20h	Guo-Feng Zhang
08:45h	Luiz Rafael Santos	João C. de O. Souza	08:45h	Nader Jafari Rad
09:10h	Thiago P. da Silveira	Romulo Castillo	09:10h	Olivier Bokanowski
09:35h	Max L. N. Gonçalves	Leandro Prudente	09:35h	Paulo F. A. Mancera
10:00h	Coffee-Break			

	Room Africa + Europe		Room Oceania	Room Mercosul
	Chair: Mikhail Solodov		Chair: Jonathan Evans	Chair: J. M. Martínez
10:30h	Hasnaa Zidani	10:30h	Shuhua Zhang	Natasa Krejic
11:15h	Aris Daniilidis	11:15h	Zhu Zuonong	Amiya Pani
12:00h	Lunch			

	Room Asia	Room Americas		Room Oceania	Room Mercosul
	Chair: Ovidiu Bagdasar	Chair: Orizon Pereira Ferreira		Chair: Elias Gudiño	Chair: Elias Gudiño
13:50h	Gislaine A. Periçaro	Pedro A. Soares Júnior	14:00h	Li Weigang	Neela Nataraj
14:15h	Leonardo M. Mito	Adriano Delfino			
14:40h	Adriano Delfino	Teles Araújo Fernandes	14:45h	Hugo de la Cruz	
15:05h	Ovidiu Bagdasar	Orizon Pereira Ferreira			
15:30h	Coffee-Break				

	Room Africa + Europe
	Chair: José Mario Martínez
16:00h	Jinyun Yuan

	Room Africa + Europe
16:45h	FOZ 2018 - ICM Sattelite Event Closing Session

Communication Session · Plenary Session · Special Session · Break

DAY 1
BRAZIL OPTIMIZATION

On variational problems for random Lagrangian systems and KPZ universality

Konstantin Khanin[1]

We shall discuss the problem of global minimizers for random Lagrangian systems. While the situation in the compact setting is well understood by now, the case of unbounded space remains largely open We shall also discuss a connection with the problem of KPZ (Kardar-Parisi-Zhang) universality.

[1] University of Toronto, Canada;

Standard Fractional Quadratic Programming and Eigenvalue Complementarity Problem

Joaquim Judice[1]
Alfredo Iusem[2]
Masao Fukushima[3]
Valentina Sessa[4]

In this talk, we address the computation of a Stationary Point (SP) for the Standard Fractional Quadratic Program (SFQP). It is shown that this problem is equivalent to an Eigenvalue Complementarity Problem (EiCP) with symmetric matrices. EiCP is an extension of the traditional Eigenvalue Problem. We discuss iterative algorithms for the solution of symmetric and nonsymmetric EiCPs, namely an Alternative Direction Method of Multipliers (ADMM) and a splitting algorithm. Some results concerning the convergence of these algorithms are introduced. The splitting algorithm is shown to perform well for the symmetric EiCP (SP of SFQP). ADDM is in general robust but slow for symmetric and nonsymmetric EiCP. A hybrid method combining ADMM and the semi-smooth Newton (SN) method is introduced and is shown to be efficient for solving symmetric and nonsymmetric EiCP.

[1] Instituto de Telecomunicações, Portugal;
[2] IMPA, Rio do Janeiro, Brazil;
[4] Nanzan University, Japan
[5] University of Sannio, Benevento, Italy;

A sequential optimality condition associated to quasinormality and its algorithmic consequences

Roberto Andreani[1]
Nadia Fazzio[2]
Maria Laura Schuverdt[2]
Leonardo Secchin[3]

In the present paper, we prove that the Augmented Lagrangian method converges to KKT points under the quasinormality constraint qualication, which is associated to the external penalty theory. For this purpose, a new sequential optimality condition, called PAKKT, for smooth constrained optimization is dened. The new condition takes into account the sign of the dual sequence, constituting an adequate sequential counterpart to the (extended) Fritz-John necessary optimality conditions popularized by Bertsekas and Hestenes. We also define the appropriate strict constraint qualification associated with the PAKKT sequential optimality condition and we prove that it is strictly weaker than both quasinormality and cone continuity property constraint qualifications. This generalizes all previous theoretical convergence results for the Augmented Lagrangian method in the literature.

[1] University of Toronto, Canada;
[2] Universidad de la Plata, Argentina;
[3] Universidade Federal de Espírito Santo, Brazil;

An approach for stabilizing simulation of stochastically perturbed systems

Hugo de la Cruz[1]

To be announced.

[1] FGV-Rio, Brazil;

Click here to see the schedule

A Regularized Interior-Point Method for Constrained Nonlinear Least Squares

Abel Soares Siqueira[1]
Dominique Orban[2]

We propose an interior-point algorithm for constrained nonlinear least-squares problems based on the primal-dual regularization of Friedlander and Orban (2012). At each iteration, we solve a linear system with a symmetric quasi-definite matrix. This system can be solved via LDLT factorization or with the use of iterative methods for linear least squares. This last approach results in a factorization-free implementation, that is, one using only matrix-vector products, which is desirable for large-scale problems.

[1]UFPR - Federal University of Parana, Brazil;
[2]GERAD/Polytechnique Montreal, Canada.

On the use of third-order derivatives in regularization methods

John L. Gardenghi[1]
Ernesto G. Birgin[2]
Jose M. Martínez[1]
Sandra A. Santos[1]

In the context of complexity analysis in nonlinear optimization, a recent interest in regularization methods had a surge in the last years. In particular, it was shown in a recent paper that worst-case evaluation complexity $O(\epsilon^{-(p+1)/p})$ may be obtained by means of algorithms that employ sequential approximate minimizations of p-th order Taylor models plus $(p+1)$-th order regularization terms. This result generalizes the case $p=2$, known since 2006 and successfully implemented afterwards. The natural question that we made was if there was a reasonable implementation for the case $p=3$, i.e., the case for which we apply third-order derivatives of the objective function and fourth-order regularization models. We present the algorithm and numerical results of such an implementation, with classic problems from the literature.

[1] IMECC-Unicamp, Brazil;
[2] IME-USP, Brazil;

A structured SQP algorithm for solving the constrained least squares problem

Graciela Noemi Sottosanto[1]
Graciela Marta Croceri[1]
Gonzalo Pizarro[1]

In this work, we propose a method that belongs to the class of sequential quadratic programming (SQP) for solving the nonlinear least squares problem with equality and inequality constraints. In order to exploit the structure present in the problem, a structured secant approach of the Hessian matrix, belonging to the BFGS family, is used. To enlarge its convergence region, techniques of trust region methods are employed. As a merit function, an augmented Lagrangian function is used to avoid the need of calculating second order correction steps. A feasibility restoration phase is introduced if inconsistency in the subproblem occurs. During the restoration phase the trial steps are determined in two phases. First, the minimum constraint violation that can be achieved within the trust region bound is determined. Then a second subproblem is solved where the violated constraints are relaxed. The quality of a calculated trial step is evaluated by means an update scheme for the penalty parameter. The presented algorithm is implemented in Scilab. Some numerical results are given to compare the proposed algorithm with some existing methods.

[1] Universidad Nacional del Comahue, Argentina;

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Local convergence of Levenberg-Marquardt methods for nonzero-residue nonlinear least-squares problems under an error bound condition

Douglas S. Gonçalves[1]
Sandra A. Santos[2]
Roger Behling[1]

The Levenberg-Marquardt method (LMM) is widely used for solving nonlinear equations and nonlinear least-squares problems. For consistent systems of nonlinear equations or zero-residue nonlinear least-squares problems, many recent papers have proved the local convergence of LMM for suitable choices of the regularization parameter and under error bound conditions, that are weaker than non-singularity assumptions. \\ In this study, we consider the class of non-zero residue nonlinear least-squares problems and, by viewing the LM model as a Quasi-Newton model with quadratic regularization, we present a local convergence analysis for LMM under a different error bound condition.

[1] UFSC - Federal University of Santa Catarina, Brazil;
[2] UNICAMP - University of Campinas, Brazil;

The Thermistor Problem with Hyperbolic Electrical

Mary Durojaye[1]
J.T. Agee[2]

This paper presents the steady state solution of the one-dimensional, positive temperature coefficient (PTC) thermistor equation, using the hyperbolic-tangent function as an approximation to the electrical conductivity of the device. The hyperbolic-tangent function describes the qualitative behaviour of the evolving solution of the thermistor in the entire domain. The steady state solution using the new approximation yielded a distribution of device temperature over the spatial dimension and all the phases of temperature distribution of the device without having to look for a moving boundary which has been a major problem encountered in literature. The analysis of the steady state solution and the numerical solution of the unsteady state is presented in the paper.

[1] University of Abuja, Nigeria;
[2] University of KwaZulu - Natal, South Africa;

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Superconvergence of edge finite element solution for Maxwell's

Chao Wu[1]
Jinyun Yuan[2]
Yunqing Huang[3]

In this talk, we discuss the superconvergence of edge finite element solution for Maxwell's equations. First, we solve Maxwell's equations by linear edge finite element method on both uniform triangular mesh and strongly regular triangle mesh, we obtain superconvergence results at the interior edge by using the average technology. Second, we resolve Maxwell's equations by linear edge finite element method on both uniform tetrahedral mesh and strongly regular tetrahedral mesh, we obtain superconvergence results at the interior edge by using the average technology. Third, we use the second order and third order rectangular edge finite element method to solve the harmonic Maxwell's equations, we obtain the superconvergence results at Gauss point. Finally, numerical examples to testify our theories are presented.

[1] School of Mathematics and Computational Science, Hunan University of Science and Technology, China;
[2] Universidade Federal do Paraná, Brazil;
[3] Hunan Key Laboratory for Computation and Simulation in Science, China;

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Topology Optimization in the context of heat equation

André Jacomel Torii[1]
Diogo Pereira da Silva Santos[2]

In this work we address the problem of Topology Optimization in the context of the stationary heat equation. In particular, we seek the optimum distribution of material inside a design domain subject to heat generation and/or heat external flow that minimizes the norm of the temperature field, while satisfying a prescribed amount of material to be employed. The main objective of this work is to present, in the simplest manner possible, the relation between theoretical and numerical aspects of the problem. Emphasis is given to sensitivity analysis, where both the variational problem and its Finite Element Method (FEM) approximation are presented. We also describe in details the Adjoint Method. Finally, numerical examples are presented in order to illustrate the main properties of the problem under study.

[1] UNILA, Brazil;
[2] LNCC, Brazil;

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Spectral element methods for three dimensional elliptic problems with smooth interfaces

Akhlaq Husain[1]
Arbaz Khan[2]

Many problems in engineering are characterized by elliptic partial differential equations with discontinuous coefficients, steady state heat diffusion, electro static, multi-phase and porous flow problems are the few examples. An interface problem is a special case of an elliptic partial differential equation with discontinuous coefficients. Such interface problems arise in different situations, for example, in heat conduction or in elasticity problems whose domain of definitions are composed of several different materials. In this talk we propose a least-squares spectral element method for elliptic interface problems in three dimensions with smooth interface. The solution is obtained by solving the normal equations using preconditioned conjugate gradient method. The method is essentially nonconforming and a diagonal matrix is constructed as a preconditioner based on the stability estimate and separation of variables technique. We prove that the proposed method gives exponential converges with respect to the number of elements. Numerical results for a number of test problems are presented to validate the theory and our estimates of computational complexity of the proposed method.

[1] BML Munjal University Gurgaon, India;
[2] University of Manchester, United Kingdom;

Existence and regularity of solutions of the magnetohydrodynamic system with mass diffusion

Pedro Danizete Damazio[1]
Enrique Fernández-Caras[2]
Marko A. Rojas-Medar[3]

In this talk we will present results on the existence and regularity of solutions for the model of the magnetohydrodynamic equations in presence of mass diffusion in regular enough bounded domains in 2 and 3 spatial dimension.

[1] Universidade Federal do Paraná, Brazil;
[2] Universidad de Sevilla. Spain;
[3] Universidad de Tarapacá, Chile;

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Stabilization for a Sub-quintic Wave Equation with Localized Nonlinear Damping

Maria Rosario Astudillo Rojas[1]

We consider the semilinear wave equation posed in an inhomogeneous medium with smooth boundary subject to a non linear damping distributed around a neighborhood of the boundary according to the Geometric Control Condition. We show that the energy of the wave equation goes uniformly to zero for all initial data of finite energy phase-space. We assume a nonlinearity which is subcritical in the sense that it grows as a power of at most $p < 5$ in three dimensions. The method of proof combines Strichartz's estimates, results by P. Gerard on microlocal defect measures and ideas first introduced in the literature by Lasiecka and Tataru in order to deal with the nonlinear damping term.

[1] Universidade Federal do Paraná, Brazil;

Impacts of Structural Perturbations on the dynamics of Networks

Camille Poignard[1]
Jan Philipp Pade[2]
Tiago Pereira[1]

We study the effects of structural perturbations on the dynamics of networks. We first show how the synchronizability of a diffusive network increases (or decreases) when we add some links in its underlying graph. This is of interest in the context of power grids where people want to prevent from having blackouts, or for neural networks where Synchronization is responsible of many diseases such as Parkinson. Based on spectral properties for Laplacian matrices, we show some classification results obtained (with Tiago Pereira and Philipp Pade) with respect to the effects of these links. Then I will show how we can desynchronize (i.e induce chaos) in a stable network by adding links to it.

[1] Universidade de São Paulo, Brazil;
[2] Humboldt University, Brazil;

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A new algorithm for clustering based on kernel density estimation

Mariana Kleina[1]
Luiz Carlos Matioli[1]
Solange Regina dos Santos[2]

In this paper, we present an algorithm for clustering based on univariate kernel density estimation, named ClusterKDE. It consists of an iterative procedure that in each step a new cluster is obtained by minimizing a smooth kernel function. Although in our applications we have used the univariate Gaussian kernel, any smooth kernel function can be used. The proposed algorithm has the advantage of not requiring a priori the number of cluster. Furthermore, the ClusterKDE algorithm is very simple, easy to implement, well-defined and stops in a finite number of steps, namely, it always converges independently of the initial point. We also illustrate our findings by numerical experiments which are obtained when our algorithm is implemented in the software Matlab and applied to practical applications. The results indicate that the ClusterKDE algorithm is competitive and fast when compared with the well-known Clusterdata and K-means algorithms, used by Matlab to clustering data.

[1] Universidade Federal do Paraná, Brazil;
[2] Universidade Estadual do Paraná, Brazil;

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Global Hypoellipticity on Manifolds and Fourier Expansion of Elliptic Operators

Fernando de Ávila Silva[1]
Alexandre Kirilov[1]

To be announced.

[1] Universidade Federal do Paraná, Brazil;

DAY 2

IND MATH AND BRICS

A quasi-Newton modified linear-programming-Newton method

Damián Fernández[1]
María Martínez[1]

In this work we consider a method to solve constrained system of nonlinear equations based on a modification of the Linear-Programming-Newton method and replacing the first order information with a quasi-Newton secant update, providing a computationally simple method. The proposed strategy combines good properties of two methods: the least change secant update for unconstrained system of nonlinear equations with isolated solutions and the Linear-Programming-Newton for constrained nonlinear system of equations with possible nonisolated solutions. We analyze the local convergence of the proposed method under suitable conditions proving its linear/superlinear convergence to possible nonisolated solutions.

[1] UFSC - Federal University of Santa Catarina, Brazil;
[2] FaMAF, Universidad Nacional de Córdoba, Argentina;

Nonlinear symmetric cones problems: optimality conditions and an augmented Lagrangian method

Ellen H. Fukuda[1]
Bruno F. Lourenço[1]
Masao Fukushima

Nonlinear symmetric cone problems (NSCP) generalize nonlinear semidefinite programming, nonlinear second-order cone programming and nonlinear programming (NLP) problems. In this work, we discuss the reformulation of NSCPs as NLP problems, using squared slack variables. With this, we prove a criterion for membership in a symmetric cone, and discuss the equivalence between Karush-Kuhn-Tucker points of the original and the reformulated problems. As the main result, we observe that the reformulation allows us to obtain second-order optimality conditions for NSCPs in a easy manner. We also show that by employing the slack variables approach, we can use the results for NLP to prove convergence results of a simple augmented Lagrangian function for NSCPs.

[1] Kyoto University, Japan;
[2] Nanzan University, Japan

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Non-monotone inexact restoration method for minimization with orthogonality constraints

Juliano de Bem Francisco[1]
D . G. Gonçalves[1]
L. E. T. Paredes[1]
F. S. Viloche-Bazán[1]

In this work we consider the problem of minimizing a differentiable functional restricted to the set of matrices (of order nxp) with orthogonal columns. This problem arises from different fields of applications, such as, statistical, signal processing, global positioning system, machine learning, physics, chemistry and others. The numerical framework behind our approach is a non-monotone variation of the inexact restoration method. We give a simple characterization of the set of tangent directions (with respect to the orthogonal constraints) in order to handle with the tangent phase. For the restoration phase we use the well-known Cayley transformation for bring the computed point (at the tangent phase) back to the feasible set (i.e., the restoration phase is exact). We prove that all limit points of the generated sequence is stationary and we compare numerically our method with a well established algorithm for solving this optimization problem.

[1] Federal University of Santa Catarina, Brazil;
[2]

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Accelerated primal-dual fixed point algorithms for ridge regression problems

Ademir Alves Ribeiro[1]
Peter Richtárik[2]
Tatiane Cazarin da Silva[3]
Gislaine Aparecida Periçaro[4]

In this work we study the primal and dual formulations of the regularized least squares problem, in the special norm L_2, named Ridge Regression. We observe that the optimality conditions describing the primal and dual optimal solutions can be formulated in several different but equivalent ways. The optimality conditions we identify form a linear system involving a structured matrix depending on a single relaxation parameter which we introduce for regularization purposes. This leads to the idea of studying and comparing, in theory and practice, the performance of the fixed point method applied to these reformulations. We compute the optimal relaxation parameters and uncover interesting connections between the complexity bounds of the variants of the fixed point scheme we consider. These connections follow from a close link between the spectral properties of the associated matrices. For instance, some reformulations involve purely imaginary eigenvalues; some involve real eigenvalues and others have all eigenvalues on the complex circle. We show that our main method - which is a special case of the randomized dual coordinate ascent method with arbitrary sampling developed by Qu, Richtárik and Zhang - achieves the best rate in theory and in numerical experiments among the fixed point methods we study. Remarkably, the method achieves an accelerated convergence rate. We also establish the convergence of a gradient memory-like strategy. Numerical experiments indicate that our main algorithm is competitive with the conjugate gradient method.

[1]UFPR - Federal University of Parana, Brazil;
[2]University of Edinburgh, Scotland;
[3]UTFPR - Federal University of Tecnology of Parana, Brazil;
[4]State University of Parana, Brazil.

Non-monotone inexact restoration method for minimization with orthogonality constraints

Gilson do Nascimento Silva[1]
Ioannis Konstantinos Argyros[2]

In this work we consider the problem of minimizing a differentiable functional restricted to the set of matrices (of order nxp) with orthogonal columns. This problem arises from different fields of applications, such as, statistical, signal processing, global positioning system, machine learning, physics, chemistry and others. The numerical framework behind our approach is a non-monotone variation of the inexact restoration method. We give a simple characterization of the set of tangent directions (with respect to the orthogonal constraints) in order to handle with the tangent phase. For the restoration phase we use the well-known Cayley transformation for bring the computed point (at the tangent phase) back to the feasible set (i.e., the restoration phase is exact). We prove that all limit points of the generated sequence is stationary and we compare numerically our method with a well established algorithm for solving this optimization problem.

[1] Universidade Federal do Oeste da Bahia, Brazil;
[2] Cameron University, United States;

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On the complexity of an hybrid proximal extragradiente projection method for solving monotone inclusion problems

Mauricio Romero Sicre[1]

In this work we establish the iteration complexity of an under-relaxed Hybrid Proximal Extragradient Projection method (HPEP) for finding a zero of a maximal monotone operator. These results extend the complexity analysis of the Hybrid Proximal Extragradient method (HPE), due to Svaiter and Monteiro, to a more general framework.

[1] Universidade Federal da Bahia, Brazil;

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Solving Convex Feasibility Problems in Hadamard Manifolds

Joao Xavier da Cruz Neto [1]
Italo Dowel Lira [1]
Paulo Alexandre Sousa [1]
João Carlos Souza [1]

In this talk, we study the convergence issue of the gradient method for solving a convex feasibility problem in Hadamard manifolds. Clearly, our results extend the corresponding ones in Euclidean spaces and solve the open problem proposed by Bento and Melo [J. Optimization. Theory Application., 152 (2012), pp. 773-785] which was partially solved by Wang et al. [J. Optimization. Theory Application., 164 (2015), pp. 202-217].

[1] Universidade Federal do Piauí, Brazil;

On Riemannian Conjugate Gradient and non monotone linear search algorithm with mixed direction on Stiefel

Hugo José Lara Urdaneta[1]
Harry Oviedo Leon[2]
Oscar Dalmau[2]
João Carlos Souza[1]

In this talk, we study the convergence issue of the gradient method for solving a convex feasibility problem in Hadamard manifolds. Clearly, our results extend the corresponding ones in Euclidean spaces and solve the open problem proposed by Bento and Melo [J. Optimization. Theory Application., 152 (2012), pp. 773-785] which was partially solved by Wang et al. [J. Optimization. Theory Application., 164 (2015), pp. 202-217].

[1] Universidade Federal de Santa Catarina, Brazil;
[2] CIMAT, Mexico;

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Local stabilization of time periodic evolution equations

Mythily Ramaswamy[1]

Local stabilization at a prescribed rate around a periodic trajectory of parabolic systems, using boundary control is an interesting problem. The main motivating example is the incompressible Navier-Stokes system. I will discuss this example and the general framework and indicate some results in this direction.

[1] TIFR-B, India;

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A New and Enhanced Semidefinite Relaxation for a Class of Nonconvex Complex Quadratic Problems with Applications in Wireless Communications

Ya-Feng Liu [1]

In this talk, we shall consider a special class of nonconvex Complex Quadratic Problems (CQP), which finds many important and interesting applications in wireless communications. In this talk, we shall first develop a new and Enhanced Complex SemiDefinite Program, called ECSDP, for the considered CQP and then apply the ECSDP to MIMO detection, a fundamental problem in modern wireless communications. As our main result, we show the tightness of the ECSDP for MIMO detection under an easily checkable condition. This result answers an open question posed by So in 2010. Based on the ECSDP, we can also develop a branch-and-bound algorithm for globally solving the MIMO detection problem (even though the above condition does not hold true).

[1] CAS, China;

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Title and Abstract to be announced

Jian-Hua Wu[1]

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Silas Abahia Ihedioha[1]

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Ting Wei[1]

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[1] Lanzhou University, China;

Modeling of non-Fickian diffusion and dissolution from a thin polymeric coating: An application to drug-eluting stents

Elias Gudiño[1]
C. M. Oishi[2]
A. Sequeira[3]

In this talk, we present a general model for non-Fickian diffusion and drug dissolution from a controlled drug delivery device coated with a thin polymeric layer. We propose an approach to reduced the computational cost of performing numerical simulations in complex 3-dimensional geometries. The model for mass transport by a coronary drug-eluting stent is coupled with a non-Newtonian blood model flow. In order to show the effectiveness of the method, numerical experiments and a model validation with experimental data are also included. In particular, we investigate the influence of the non-Newtonian flow regime on the drug deposition in the arterial wall.

[1] Universidade Federal do Paraná, Brazil;
[2] UNESP, Brazil;
[3] IST Lisboa, Portugal;

Title and Abstract to be announced

Manoel Silvino Batalha de Araujo[1]
C. Fernandes[2]
L.L. Ferrás[2]
J. Miguel Nóbrega[2]

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[2] Institute for Polymers and Composites/i3N, University of Minho, Portugal;

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Shuanping Du[1]

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Computational simulation of non-Newtonian drop impact

Cassio M. Oishi [1]

To be announced.

[1] UNESP, Brazil;

An epsilon-VU algorithm with superlinear convergence

Shuai Liu[1]
Claudia A. Sagastizábal[1]
Mikhail V. Solodov[2]

The theories of \(\mathcal{VU}\)-space decomposition and \(\mathcal{U}\)-Lagrangian have been applied to develop algorithms for solving problems with structural properties. We introduce an algorithm based on the \(\varepsilon\)-\(\mathcal{VU}\)-space decomposition, where the \(\mathcal{V}_{\varepsilon}\)-subspace is defined by the span of some enlargement of the subdifferential. \\ The algorithm has two steps: the \(\mathcal{V}\)-step, which we show can be replaced by an exact prox-step, and the \(\mathcal{U}\)-step, a quasi-Newton step in the \(\mathcal{U}_{\varepsilon}\)-subspace. The \(\mathcal{U}\)-step requires a basis matrix of the \(\mathcal{U}_{\varepsilon}\)-subspace and a matrix containing second order information of the objective function in the \(\mathcal{U}_{\varepsilon}\)-subspace. If \(\varepsilon\) is suitably driven to zero, the superlinear convergence of the algorithm can be proven if the Dennis-More condition holds in our context. We give an application of our algorithm on minimizing a function whose proximal point can be easily calculated.

[1] IMECC/UNICAMP, Brazil;
[2] IMPA, Brazil;

An adaptive accelerated proximal point method for solving non-convex optimization problems

Jefferson G. Melo[1]
Weiwei Kong[2]
Renato DC Monteiro[2]

In this talk, we present an adaptive accelerated proximal point type method for solving non-convex optimization problems. We discuss how to compute approximate solutions of the subproblems accepting some relative error criteria. Iteration-complexity bounds for the proposed method is analyzed and some numerical experiments are presented.

[1] Universidade Federal de Goiás, Brazil;
[2] Georgia Tech, United States;

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Accelerated Regularized Newton Methods for Minimizing Composite Convex Functions

Geovani Nunes Grapiglia[1]
Yurii Nesterov[2]

In this talk, we present accelerated Regularized Newton Methods for minimizing objectives formed as a sum of two functions: one is convex and twice differentiable with H\”{o}lder-continuous Hessian, and the other is a simple closed convex function. For the case in which the H\”{o}lder parameter $\nu\in[0,1]$ is known we propose methods that take at most $\mathcal{O}\left(\dfrac{1}{\epsilon^{1/(2+\nu)}\right)$ iterations to reduce the functional residual below a given precision $\epsilon>0$. For the general case, in which the ν is not known, we propose a universal method that ensures the same precision in at most $\mathcal{O}\left(\dfrac{1}{\epsilon^{2/3(1+\nu)}\right)$

[1] UFPR - Federal University of Parana, Brazil
[2] CORE

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Analysis of EPEC Models for Power Markets

Juan Pablo Luna[1]
J. Filiberti[2]
S.A. Gabriel[2]
C. Sagastizábal[3]
M. Solodov[4]

A usual equilibrium model in power markets is to consider a leader-follower problem in which the top level involves multiplier power producers bidding prices and generation levels. At the bottom level, common to each producer, there is an independent system operator (ISO) that takes all the bids from producers and minimizes the total operation costs, subject to capacity and other bounds on production. As such, the system being modeled in an equilibrium problem with equilibrium constraints (EPEC). We show that already in their simplest instances, such models suffer from two serious drawbacks, related to: the existence of many equilibria, which harm the algorithmic solution (cycles); and equilibrium prices that can take values above the bids, even for the most expensive dispatched producer. To address these issues, we propose a dual regularization for the ISO problem, that has an enlightening interpretation in economical terms.

[1] UFRJ, Brazil;
[2] University of Maryland, College Park, Maryland, United States;
[3] UNICAMP, Brazil;
4 IMPA, Brazil;

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An algorithm for projecting a point onto a level set of a quadratic function

Fernanda Raupp[1]
Wilfredo Sosa[2]

We propose an iterative algorithm to project a point onto a level set of a quadratic function, based on the spectral decomposition of the Hessian, which is performed in a unique iteration. The proposed algorithm was tested on instances with distinct Hessian matrices and shows great potential in applications, such as in computer graphics

[1] LNCC, Brazil;
[2] UCB, Brazil;

A new quasiconvex asymptotic function with applications in optimization

Felipe Lara[1]
N. Hadjisavvas[2]
J. E. Martínez-Legaz[3]

We introduce a new asymptotic function which is mainly adapted to quasiconvex functions. We establish several properties and calculus rules for this concept and compare it to previous notions of generalized asymptotic functions. Finally, we apply our new definition to quasiconvex optimization problems: we characterize the boundedness of the function, the nonemptiness and compactness of the set of minimizers, and we provide a sufficient condition for the closedness of the image of a nonempty closed convex set via a vector-valued function.

[1] IMPA - National Institute of Pure and Applied Mathematics, Brazil;
[2] University of the Aegean, Greece;
[3] Universidad Autónoma de Barcelona, Spain;

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Limits of sequences of maximal monotone operators

Marc Lassonde[1]
Yboon García[2]

We consider a sequence (T_n) of maximal monotone operators on a reflexive Banach space. In general, the (Kuratowski) lower limit $\liminf T_n$ of such a sequence is not a maximal monotone operator. So, what can be said? In the first part of the talk, we show that $\liminf T_n$ is a representable monotone operator while its Mosco limit M-$\lim T_n$, when it exists, is a maximal monotone operator. As an application of the former result, we obtain that the variational sum of two maximal monotone operators is a representable monotone operator. In the second part of the talk, we consider a sequence (f_n) of representative functions of (T_n). We show that if (f_n) epi-converges to a function f, then $\liminf T_n$ is representable by f; moreover if (f_n) Mosco-converges to f, then $\liminf T_n$ is maximal monotone. As an application, we recover Attouch's result: if a sequence of convex lower semicontinuous functions (f_n) Mosco-converges to f, then $\partial f=\liminf \partial f_n$.

[1] Antilles University, Guadeloupe, and LIMOS, Clermont-Ferrand, France;
[2] Universidad del Pacífico, Lima, Perú;

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On the simulation and calibration of jump-diffusion models in finance

Vinicius Albani[1]

We apply a splitting strategy to identify simultaneously the local volatility surface and the jump-size distribution of a jump-diffusion driven asset from quoted European option prices. This is done by means of a Tikhonov-type regularization technique. Proofs of the convergence of the corresponding algorithm as well as the stability of the solution are provided. We also presente numerical examples with synthetic, as well as, real data illustrating the robustness of this method.

[1] UFSC, Brazil;

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Pullback dynamics of a non-autonomous Bresse system

Rawlilson de Oliveira Araújo[1]

The Bresse system is a model for vibrations of a circular arched beam. Here we discuss the existence of pullback attractors for a weakly dissipative non-autonomous semilinear Bresse.

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Title and Abstract to be announced (TBA)

Carlos Eduardo Andrades[1]
Débora Aline Kotz[1]
Rafael Berkenbrock[1]
Enio Roberto Galli[1]
Paulo Marcos Flores[1]
Luiz Antônio Rasia[1]
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Title and Abstract to be announced (TBA)

Song Liu[1]

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On an SSOR-like method with four parameters for saddle point problems

Huang Zhengda[1]
Huidi Wang

Since 2001 when several SOR-like methods for the saddle point problems was proposed by Golub, G. H., Wu, X. and Yuan, J.-Y., many papers have been appeared to consider the generalized SOR, AOR and SSOR-like methods based on the different splitting ways of the coefficient matrix and accompanied by different number of parameters. This talk is an short report on an SSOR-like method with four parameters, which is one of our works for the saddle point problem. To our best knowledge, it can't be written in the same classical forms used by the existed SSOR-like methods. A condition to guarantee the convergence and the optimal convergence factor are obtained, and comparisons with other SSOR-like methods are discussed. This work is coauthored with Dr. Huidi Wang.

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Benito Pires[1]

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[1] USP, Brazil;

Title and Abstract to be annouced (TBA)

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Xiaodong Zhang[1]

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Shifted Gradient Method for Computing Tensor Eigenpairs

Xiangyun Zhang[1]
Hao Liang[2]
Guoliang Chen[2]

In this talk, we propose a shifted gradient method (S-GM) to calculate the Z-eigenpairs of the symmetric tensor. S-GM can be viewed as a generalization of shifted symmetric higher-order power method (SS-HOPM). The convergence analysis and the fixed-point analysis of this algorithm are given. Numerical examples show that S-GM needs fewer iterations than SS-HOPM when the appropriate parameters were selected.

[1] East China Normal University, China;
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