



ICIAM  
2019  
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# CERTIFICATE OF PRESENTATION

**Andrei Ermakov, Yury Stepanyants**

presented the Poster titled:

***Transformation of long surface waves in the  
coastal zone with a variable bathymetry***

in the **9<sup>th</sup> International Congress on  
Industrial and Applied Mathematics**,  
held in Universitat de València · Campus Blasco Ibáñez,  
Valencia (Spain), July 15<sup>th</sup>- 19<sup>th</sup>, 2019.

**Tomás Chacón**  
ICIAM 2019 Valencia  
Congress Chairman

**Rosa Donat**  
President of the Spanish Society for  
Applied Mathematics

$\leq 4\delta^2 - 4\delta^2 = 0$ .

Let  $(H, (\cdot, \cdot))$  be an IPS and  $M$  is a compl  
approximation to  $x$  in  $M$ , then  
 $x - y \perp M$ .

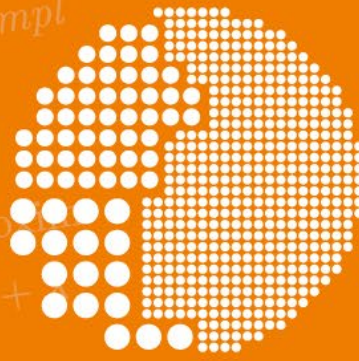
$n \neq 0$ . For any  $\lambda \in \mathbb{F}$ , by best approx  
 $\|y + \lambda m\|^2 = \|x - y\|^2 + \bar{\lambda}(x - y, m) +$   
 $\|m\|^2$ , we have  
 $\leq -\bar{\lambda}\lambda\|m\|^2 - \lambda\bar{\lambda}\|m\|^2 + |\lambda|^2\|m\|^2 = -$   
 $(x - y, m) = 0$

is,  $x - y \perp M$ .

Let  $H$  be an IPS and  $M \subset H$ ,  
 $M^\perp = \{x \in H : (x, m) = 0 \forall m$   
referred to as "M-perp."

Suppose  $H$  is an IPS and  $M \subset H$ .  
is either  $\{0\}$  or  $\emptyset$ .

of the inner-



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**PROGRAM &  
ABSTRACTS BOOK**

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- PA-020**  
 Numerical models for nonlinear ultrasound in bubbly liquids  
 Maria Teresa Tejedor Sastre Universidad Rey Juan Carlos  
 Christian Vanhille Universidad Rey Juan Carlos  
**Abstract:** This work studies the nonlinear propagation of ultrasound in bubbly liquids. Numerical models in several dimensions are developed to solve a system formed by the wave and a Rayleigh-Plesset equations, which describes the nonlinear interaction between acoustic field and bubble vibrations. Our results show different characteristics of the waves in the nonlinear and dispersive media. This work is funded by AEI-ERDF (Spain, DPI2017-84758-P).
- PA-021**  
 Transformation of long surface waves in the coastal zone with a variable bathymetry  
 Andrei Ermakov University of Southern Queensland  
 Yury Stepanyants University of Southern Queensland  
**Abstract:** The transformation of long linear waves in a coastal zone of an ocean with the variable bathymetry is considered. The coefficients of transmission and reflection are calculated as the functions of frequency and the total depth drop for three typical models: (i) piece-linear, (ii) piece-quadratic, and (iii) hyperbolic tangential depth profiles. Wave scattering on three models of underwater barrier/trench are also studied; the results obtained are compared with each other and with earlier obtained.
- PA-022**  
 Bidiagonal decomposition and accurate computations with Laguerre matrices  
 Héctor Orera Universidad de Zaragoza  
 Jorge Delgado Universidad de Zaragoza  
 Juan Manuel Peña Universidad de Zaragoza  
**Abstract:** Matrices with all minors nonnegative are called totally positive (TP) matrices. Nonsingular TP matrices admit a unique bidiagonal decomposition, which can be used as a parameterization to perform many algebraic computations with high relative accuracy (HRA). We have developed an accurate method to obtain the bidiagonal decomposition of collocation matrices of generalized Laguerre polynomials and of Lah matrices, which is the key tool to compute their eigenvalues, singular values and inverses with HRA.
- PA-023**  
 An innovative approach to solve triangular type-2 intuitionistic fuzzy matrix games  
 Tina Verma Indian Institute of Technology Ropar  
**Abstract:** Matrix games deals with real life situations and for matrix games, the payoffs should be known in advance. The payoffs for the matrix games were considered as real numbers which are unable to represent real life situations. To be more realistic, the classical theory is generalised by fuzzy set theory which involves linguistic terms, uncertainty. An approach for solving matrix games with triangular type-2 intuitionistic fuzzy payoffs is proposed and used it for water management.
- PA-024**  
 Decentralized and Asynchronous Spillover Algorithm for Capacitated Lot Sizing Problem  
 Marin Lujak IMT Lille Douai  
 Eva Onaindia Universitat Politècnica de València  
 Alberto Fernandez University Rey Juan Carlos  
**Abstract:** In this paper, we study decentralized approaches to the capacitated lot sizing problem (CLSP). Apart from production and manufacturing, CLSP formulation can be effectively used in many other scenarios like grid computing, energy management, healthcare, and transportation. We develop a decentralized mathematical model for the CLSP and a time-effective and optimal decentralized heuristic algorithm based on the spillover effect. We demonstrate the functioning of the algorithm and compare it with the results obtained in CPLEX.
- PA-025**  
 Dynamic Pricing In Insurance  
 Yuqing Zhang The University of Manchester  
 Neil Walton The University of Manchester  
**Abstract:** We study the dynamic pricing in insurance from the perspective of an insurance company. We consider the problem of online revenue management for selling a new product. The insurance company can only observe realised demand and incurred claims but does not know the underlying functions for the product. We develop two pricing models: parametric and non-parametric models to balance between exploration (demand/claims learning) and exploitation (pricing) trade-off, to maximize revenues.
- PA-026**  
 Effective Competency-based Differential Evolution Algorithm for Numerical Optimization  
 Harish Sharma Rajasthan Technical University  
 Kota India  
**Abstract:** In Differential Evolution (DE) algorithm, every solution is given an equal chance to take part in the solution search process and in case of stagnation; it is difficult to get out from this situation. Therefore, a competency-based position update process is integrated with DE to boost the speed of convergence in addition to the diversification ability of the algorithm. The efficiency of the proposed algorithm is analyzed over a set of 20 real-world optimization problems.
- PA-027**  
 Group decision making in multi-objective optimization  
 Surafel Lulseged Tilahun Department of Mathematical Sciences, University of Zululand  
**Abstract:** Optimization problems, formulated from a real scenario, involves multiple and often conflicting objectives. A compromised solution is said to be Pareto optimal if it is not possible to improve any of the objectives without worsening another. Choosing one among this set of Pareto optimal solutions depends on the preference of a decision maker. In some cases there will be multiple decision makers, possibly with conflicting preference. This research presents group preference in multi-objective optimization.
- PA-029**  
 Maximum entropy distributions in Wasserstein balls  
 Luis Felipe Vargas Universidad de Los Andes  
 Mauricio Velasco Universidad de Los Andes  
**Abstract:** We present a method for finding the probability distribution of maximum entropy contained in the Wasserstein ball of a given radius centered in the empirical measure defined by  $n$  data-points in  $k$ . Such distributions are the most general (minimizing the amount of prior information) and are therefore of central importance in statistical inference. The poster will contain new theoretical results on how to efficiently describe such probability distributions as well as some practical implementation results.
- PA-030**  
 Non-convex Analysis of Multi-Graph Matching  
 Vahan Huroyan University of Arizona  
 Gilad Lerman University of Minnesota  
 Deepti Pachauri 3M  
**Abstract:** The Multi-Graph Matching (MGM) problem assumes a set of graphs with fixed number of vertices and one-to-one correspondence maps between the vertices of each pair. Given only noisy measurements of the mutual correspondences, the MGM problem asks to improve the correspondence maps between pairs. We propose an iterative algorithm (with guarantees of linearly convergence) to solve the non-convex MGM problem. Numerical experiments demonstrate the competitive speed and accuracy of our method compared to state-of-the-art methods.

## PA-021

Transformation of long surface waves in the coastal zone with a variable bathymetry

Andrei Ermakov

University of Southern Queensland

Yury Stepanyants

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**Abstract:** The transformation of long linear waves in a coastal zone of an ocean with the variable bathymetry is considered. The coefficients of transmission and reflection are calculated as the functions of frequency and the total depth drop for three typical models: (i) piece-linear, (ii) piece-quadratic, and (iii) hyperbolic tangential depth profiles. Wave scattering on three models of underwater barrier/trench are also studied; the results obtained are compared with each other and with earlier obtained.