

Preface

We are honored to present this special issue in *Matemática Contemporânea*. This volume collects papers that were presented at the XIV ENAMA (Encontro Nacional de Análise Matemática e Aplicações), held from November 03 to 05, 2021, and was organized by the following institutions: UFCG (Universidade Federal de Campina Grande) and UEPB (Universidade Estadual da Paraíba). ENAMA is an annual scientific meeting with the purpose of creating a forum for debates among students, professors and researchers, having as areas of interest: Functional Analysis, Numerical Analysis, Partial, Ordinary and Functional Differential Equations.

The call for papers was made by the XIV ENAMA scientific committee, at the invitation of Professor Jaqueline Mesquita, editor-in-chief of *Matemática Contemporânea* and also a member of the committee. In total, 15 research papers have been selected for this special issue, containing relevant results in the areas of mathematical modeling, functional analysis, elliptic and evolution PDEs, ordinary and functional differential equations, as we describe below.

There are two papers accepted for publication in mathematical modeling. The first paper concerns an important topic: modeling of fluid internal traveling waves. The authors reduce a two-equation wave model to a single equation, and prove the existence of smooth periodic solutions for the resulting model. The reduction is based on asymptotic expansions with respect to physical parameters involving the thicknesses of the fluid layers and the wave length. The second paper involves the timely topic of compartmental models in epidemiology. The authors present a Susceptible-Infected-Recovered (SIR) model based on fractional calculus, and analyze the equilibrium points, to which the solutions asymptotically converge. Several thought provoking numerical simulations are presented.

There are two papers accepted for publication in Functional Analysis. The paper by Velanga presents an extension of the real Bohnenblust-Hille inequality to the multi-polynomial environment and a brief survey on the lower bounds for this inequality. The paper by Mauro and Pombo Jr. introduces the strictly minimal linearly topologized rings and it is shown that every discrete valuation ring is strictly minimal. Necessary and sufficient conditions for a Hausdorff linearly topologized ring to be strictly minimal are obtained, as well as necessary and sufficient conditions for a complete Hausdorff linearly topologized ring to be strictly minimal.

As far as Elliptic PDEs are concerned, there are four papers accepted for publication. The first one deals with fourth-order superlinear elliptic problems, with Navier boundary conditions, in which the authors use a local linking theorem to get the solutions. In the second paper, the author studies an elliptic PDE with a degenerate elliptic operator, through an approach based on the approximation by non-degenerate problems. In the third and fourth works, the authors present surveys on very current and fruitful topics on elliptic PDEs. To be more specific, in the third one, the authors provide an up-to-date overview on the regularity theory for fully nonlinear elliptic problems, with unbalanced degeneracy. On the other hand, in the fourth paper, the author presents the main arguments to get solutions to Schrödinger-Born-Infeld systems.

There are six papers accepted for publication in Evolution PDEs. The paper by Rodríguez-Bellido et al. establishes the convergence rate of Galerkin approximations for magnetohydrodynamic-type equations. By proving optimal error estimates, the authors obtain similar results as the ones for the Navier-Stokes equation. The paper by Nascimento presents the existence of global solutions for the Cauchy problem, with small initial data, associated to the

semilinear wave equation with time-dependent exponential speed of propagation, mass and dissipation. The main results follow as an application of the Banach fixed point theorem combined with linear estimates. The paper by A. T. Lourêdo et al. studies the existence of solutions of a mathematical model that describes the vibration of a bar. The problem is posed in an interval and the bar is clamped in one end and it is free in the other one. The authors use the Galerkin approach to obtain the existence of solutions. The present model has a Dirac delta in the initial conditions. The solution defined by transposition is obtained as the limit of regular solutions. Trace theorems of non-smooth functions and interpolation of Hilbert spaces are used in this approach. The paper by D. C. Pereira and G. M. de Araújo analyzes a variational inequality for an extensible beam equation with internal damping and source terms. The global solutions are constructed by using the penalty method combined by Faedo-Galerkin approximations and the potential well theory. The paper by Jandeilson S. Da Silva et al. shows the existence of exponential attractor for a non-local evolution equation, which generalizes the model that describes the neuronal activity. As a consequence, the authors showed that the global attractor has finite fractal dimension. The construction of the exponential attractor for the studied model is standard and the transition of the discrete scenario to continuous one is correct. However, due to the generality of the model, the combined results in this manuscript generate some novelty. The paper by Juliano Andrade de and J. A. Soriano solves the problem of exact border controllability for the Bresse system. To do this, the authors use the observability inequality, through Carleman estimates, and the HUM (Hilbert Uniqueness Method) proposed by J. L. Lions.

Finally, in this issue, there is one paper published in the area of ordinary differential equations, this paper is written by the authors Maria Andrade and Pietro da Silva, and is a survey dedicated to describing some recent advances on Besse's Conjecture.

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Contributed papers

- Travelling wave solutions for an internal wave model,
W.C. Lesinhevski and A. R. de Zarate.
- Some remarks on an arbitrary-order SIR model constructed with Mittag-Leffler distribution,
N.Z. Monteiro and S.R. Mazorche.
- On the real multipolynomial Bohnenblust-Hille inequality,
T. Velanga.
- Strictly minimal linearly topologized rings,
P.C.G. Mauro and D.P. Pombo Jr.
- Fourth-order superlinear elliptic problems interacting with high eigenvalues,
T.R. Cavalcante and E.D. Silva.
- Existence and approximation of solutions for a class of degenerate elliptic equations with Neumann boundary condition
A. C. Cavalheiro.
- Recent developments for fully nonlinear PDEs with unbalanced degeneracy,
J.V. da Silva, E.C.B. Júnior, G.C. Rampasso and G.C. Ricarte, H.Vivas.
- Ground state solutions for Schrödinger-Born-Infeld equations,
G. Siciliano.
- On the convergence rate of Galerkin approximations for the magnetohydrodynamic type equations,
M. Á. Rodríguez-Bellido, M.A. Rojas-Medar and Alex Sepúlveda-Cerda.
- Semilinear wave equation with time-dependent exponential speed of propagation, mass and dissipation propagation, mass and dissipation,
W.N. do Nascimento.
- Vibrations of Bars by Impact,
M. Milla Miranda, L.A. Medeiros and A.T. Lourêdo.
- On a Variational Inequality for a Beam Equation with Internal Damping and Source Terms,
D.C. Pereira and G. M. de Araújo.
- Exponential attractor for a class of non local evolution equations,
J. S. da Silva, S. H. da Silva and A. T. Lourêdo.
- Border control for the Bresse system by Carleman estimation,
J. de Andrade and J. A. Soriano.
- A short overview of Besse's conjecture,
M. Andrade and P. da Silva.