

Editorial

Preface to *Numerical and Symbolic Computation: Developments and Applications—2019*

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This book constitutes the printed edition of the Special Issue *Numerical and Symbolic Computation: Developments and Applications—2019*, published by *Mathematical and Computational Applications* (MCA) and comprises a collection of articles related to works presented at the 4th International Conference in Numerical and Symbolic Computation—SYMCOMP 2019—that took place in Porto, Portugal, from April 11th to April 12th 2019.

This conference series has a multidisciplinary character and brings together researchers from very different scientific areas, aiming at sharing different experiences, in a cross-fertilization perspective. Therefore, the articles contained in this book, although sharing a common characteristic related to the use of numerical and/or symbolic methods and computational approaches, also present an overview of their use in a transversal way to science and engineering fields.

In the first contribution *Bridging Symbolic Computation and Economics: A Dynamic and Interactive Tool to Analyze the Price Elasticity of Supply*, from Andraz et al. [1], the authors propose a new dynamic and interactive tool, created in the computer algebra system Mathematica and available in the Computable Document Format. This tool can be used as an active learning tool to promote better student activity and engagement in the learning process, among students enrolled in socio-economic programs.

The second article of the book is authored by Escobar et al. [2] and has the title *The Invariant Two-Parameter Function of Algebras $\bar{\psi}$* . In this article, it is proven that the five-dimensional classical-mechanical model built upon certain types of five-dimensional Lie algebras cannot be obtained as a limit process of a quantum-mechanical model based on a fifth Heisenberg algebra. Other applications to physical problems are also addressed.

Gavina et al. [3], in their article *Solving Nonholonomic Systems with the Tau Method*, propose a numerical procedure based on the spectral tau method to solve nonholonomic systems. The Lanczos' spectral tau method is used to obtain an approximate solution to these nonholonomic problems exploiting the tau toolbox software library, adding to the ease of use characteristics and providing accurate results.

The contribution of Matos and Rodrigues [4], *Almost Exact Computation of Eigenvalues in Approximate Differential Problems*, addresses differential eigenvalue problems that arise in many fields of Mathematics and Physics. These authors present a method for eigenvalues computation following the Tau method philosophy and using Tau Toolbox tools, wherein the eigenvalue differential problem is translated into an algebraic approximated eigenvalues problem, after which by making use of symbolic computations, they arrive at the exact polynomial expression of the determinant of the algebraic problem matrix, allowing us to get high accuracy approximations of differential eigenvalues.

In a different area, Monteiro et al. [5], through their article *Factors for Marketing Innovation in Portuguese Firms CIS 2014*, aim at understanding which factors influence marketing innovation and also

aim to establish a business profile of firms that innovate or do not in marketing. These authors used multivariate statistical techniques, such as, multiple linear regression (with the Marketing Innovation Index as dependent variable) and discriminant analysis where the dependent variable is a dummy variable, indicating if the firm innovates or not in marketing.

The sixth article *Numerical Optimal Control of HIV Transmission in Octave/MATLAB*, from Campos et al. [6], provides a GNU Octave/MATLAB code for the simulation of mathematical models described by ordinary differential equations and for the solution of optimal control problems through Pontryagin's maximum principle. A control function is introduced into the normalized HIV model and an optimal control problem is formulated, where the goal is to find the optimal HIV prevention strategy that maximizes the fraction of uninfected HIV individuals with the least amount of new HIV infections and cost associated with the control measures.

The contribution of Rodrigues [7] entitled *Isogeometric Analysis for Fluid Shear Stress in Cancer Cells* constitutes the seventh and last paper of this book. In this article, the author considers the modelling of a cancer cell using non-uniform rational b-splines (NURBS) and uses isogeometric analysis to model the fluid-generated forces that tumor cells are exposed to, in the vascular and tumor microenvironments, during the metastatic process. The aim of the article is focused on the geometrical sensitivities to the shear stress exhibition of the cell membrane.

At this point, as editors of this book, we would like to express our deep gratitude for the opportunity to publish with MDPI. This acknowledgment is deservedly extensive to the MCA Editorial Office and more particularly to Mr. Everett Zhu, who has permanently supported us in this process. It was a great pleasure to work in such conditions. We look forward to collaborating with MCA in the future.

Conflicts of Interest: The authors declare no conflict of interest.

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