
Editorial

Davide La Torre

Department of Economics, Management and Quantitative Methods,
University of Milan via Conservatorio 7, 20122 Milan, Italy
E-mail: davide.latorre@unimi.it

Franklin Mendivil

Department of Mathematics and Statistics,
Acadia University,
Wolfville, NS B4P 2R6, Canada
E-mail: franklin.mendivil@acadiau.ca

Biographical notes: Davide La Torre holds a Master in Applied Mathematics and a PhD in Computational Mathematics and Operations Research. His research interests include dynamical systems, inverse problems and optimisation.

Franklin Mendivil studied at the Georgia Institute of Technology, obtaining a BS in Civil Engineering and a PhD in Mathematics. His research interests include fractal analysis, fractal geometry and optimisation.

It is a real pleasure to announce the publication of the first issue of the *International Journal of Applied Nonlinear Science (IJANS)* by Inderscience Publishers.

IJANS aims to publish high quality original research contributions on the mathematical modelling of non-linear phenomena, fundamental theories, principles and general methods, computational methods and numerical simulations in non-linear science and engineering, and applications in related areas of science.

IJANS' inaugural issue contains seven interesting papers belonging to different research fields.

In the first paper, 'Fractal homeomorphism for bi-affine iterated function systems' by Michael Barnsley and Andrew Vince, the authors analyse the properties of fractal homeomorphisms between the attractors of two bi-affine iterated function systems. After a general discussion of bi-affine functions, conditions are provided under which a bi-affine iterated function system is contractive, thus guaranteeing an attractor. Fractal homeomorphisms are constructed for a specific type of bi-affine iterated function system.

In the second contribution, 'Numerical solution of non-linear Fredholm-Hammerstein integral equation via Schauder bases' by M.I. Berenguer and D. Gámez, the authors obtain an approximation of the solution of the non-linear Fredholm-Hammerstein integral equation by means of a new method for its numerical resolution. The main tools used to establish it are the properties of a Schauder basis in a Banach space and the Banach fixed point theorem.

In the third paper, ‘Inverse problems for DEs and PDEs using the collage theorem: a survey’ by Herb Kunze, Davide La Torre, Franklin Mendivil and Edward Vrscay, the authors present several methods based on the collage theorem and its extensions for solving inverse problems for initial value and boundary value problems. Several numerical examples, which include an application to the Euler-Bernoulli beam equation with boundary measurements, show the quality of this approach and its stability.

In the fourth paper, ‘Ranges of operators and convex variational inequalities’ by Ana Isabel Garralda-Guillem and Manuel Ruiz Galán the authors conduct the analysis of the range of a continuous and linear operator between Banach spaces, approached through non-linear techniques, more precisely, by means of the classical Fan minimax theorem. They characterise the elements in the range of such an operator as those satisfying a certain variational inequality and provide a numerical scheme of Galerkin type to determine approximately the preimage of an element that lies in that range. The passage from the theoretical setting to its numerical realisation is done by means of the use of bases in adequate spaces. In addition they deal with the extension of the previous results to the case of systems of variational inequalities.

In the fifth paper, ‘Environmental shocks and sustainability in a basic economy-environment model’ by Fabio Privileggi and Simone Marsiglio, the authors study a stochastic, discrete-time, economy-environment integrated model, where human activity affects the evolution of pollution over time. They assume that exogenous i.i.d. environmental shocks determine the rate of pollution transfer and they show that the pollution to capital ratio dynamics can be read as an iterated function system converging to an invariant distribution supported on a (asymmetric) cantor set.

In the sixth paper, ‘A note on intraday option pricing’ by Enrico Scalas and Mauro Politi, the authors provide an exact and explicit general formula for the martingale price of a European call option written on a compound renewal process. The option price is obtained using the direct method of indicator functions.

Finally in the seventh paper, ‘On the attractor of one-dimensional infinite iterated function systems’ by Giorgio Mantica, the author studies the attractor of iterated function systems composed of infinitely many affine, homogeneous maps. In the special case of second generation IFS (defined in this paper), the author conjectures that the attractor consists of a finite number of non-overlapping intervals. Numerical techniques are described to test this conjecture, and a partial rigorous result in this direction is proven.