APPROXIMATION METHODS AND MATHEMATICAL MODELS

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ABSTRACT

Approximation theory is a branch of mathematics that bridges pure and applied mathematics. It overlaps with both classical and modern analysis, as well as numerical analysis, linear algebra, and even various branches of applied mathematics. New enhancements in approximation theory therefore have a deep impact on various other scientific fields such as the numerical solution of differential and integral equations, image and data processing, inverse problems, optimization and machine learning.

On the other hand, mathematical models are important tools for several real life problems. In fact, by means of a system of Ordinary Differential Equations (ODE) or Partial Differential Equations (PDE) one can describe the interaction between two or more populations of a biological system. The obtained models can be studied both qualitatively, by using analytical methods, but also quantitatively, by means of the numerical simulations.

The complexity of a system to be modelled is reflected in the nonlinearities of the model itself, which makes the analytical approach difficult to be put in place. For this last case the numerical methods are of paramount importance both for the computation of the state variables of the model and also of the significant observables related to the model. In particular, efficient and accurate numerical schemes are needed.

This Mini Symposium (MS) brings together researchers working in different fields of numerical analysis and mathematical modelling, with a special focus on applied sciences.

The objective of the session is to present a selection of recent developments of numerical schemes used for a better understanding of real world problems, as well as present studies where these novel methods have been used to answer open mathematical and biological questions.

The MS topics include but are not limited to: approximation methods; inverse problems; machine learning; mathematical biology; mathematical ecology; mathematical epidemiology; numerical integration; numerical solution of ODE and PDE; optimal control; optimization; numerical linear algebra; population dynamics.