Fixed Point Theory and Applications to Fractional Ordinary and Partial Difference and Differential Equations

One of the most important topics in mathematics is the differential and integral calculus and it appears naturally in numerous scientific problems, which have been widely applied in physics, chemical technology, optimal control, finance, signal processing, etc., and are modeled by ordinary or partial difference and differential equations.

In recent years, it has been observed that many real-world phenomena cannot be modeled by ordinary or partial differential equations or standard difference equations defined via the classical derivatives and integrals. In fact, these problems followed the appearance of fractional calculus (fractional derivatives and integrals), intended to handle the problems for which classical calculus was insufficient. Together with the development and progress in fractional calculus, the theory and applications of ordinary and partial differential equations with fractional derivatives became one of the most studied topics in applied mathematics. The wide application potential of fractional differential equations in many fields of science has been underlined by a vast number of articles, books, and scientific events on the subject.

Fixed point theory, on the other hand, is a powerful mathematical tool to establish the existence and uniqueness of almost all problems modeled by nonlinear relations. Consequently, the existence and uniqueness of solutions of fractional differential equations are studied using fixed point theory. For about a century, fixed point theory has begun to take shape and developed rapidly. Due to its applications, fixed point theory is highly appreciated and continues to be explored. Besides, this theory can be applied to many types of spaces, such as abstract spaces, metric spaces, and Sobolev spaces. This feature of fixed point theory makes it very valuable in studying numerous problems of practical sciences modeled by fractional ordinary and partial differential and difference equations.

This Special issue aims to collect original papers and share/discuss new ideas for theoretical advances in fixed point theory and applications to fractional ordinary and partial difference and differential equations.

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Submission email: iwnaameeting@gmail.com

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