

Preface

This is a supplementary, complementary, and companion booklet monograph to the recently published monograph, by the same authors: “Intelligent Numerical Methods: Applications to Fractional Calculus”, Studies in Computational Intelligence 624, Springer Heidelberg New York, 2016. It is the analog of the last one, regarding applications of Newton-like and other similar methods for solving multivariate equations, which involve Caputo-type fractional mixed partial derivatives and multivariate fractional Riemann–Liouville integral operators. These are studied for the first time in the literature, and chapters are self-contained and can be read independently. This booklet monograph is suitable to be used in related graduate classes and research projects. We exhibit the maximum of these numerical methods at the fractional multivariate level.

The list of presented topics follows:

A fixed point convergence theorem with applications in left multivariate fractional calculus.

Fixed point schemes with applications in right multivariate fractional calculus.

Results on the semilocal convergence of iterative methods with applications to k -multivariate fractional calculus.

Newton-like methods and their applications in multivariate fractional calculus.

Implicit iterative methods for solving equations with applications in multivariate calculus.

On the monotone convergence of general iterative methods with applications in fractional calculus.

Extending the applicability of the local and semilocal convergence of Newton’s method.

On left multidimensional Riemann–Liouville fractional integral.

On right multidimensional Riemann–Liouville fractional integral.

For the last two topics, see Chaps. 8–9. These were studied on the sole purpose to support the fractional essential parts of Chaps. 1–3.

An extensive list of references is given per chapter.

The book's results are expected to find applications in many areas of applied mathematics, stochastics, computer science, and engineering. As such this short monograph is suitable for researchers, graduate students, and seminars of the above subjects, also to be in all science and engineering libraries.

The preparation of the book took place during 2015–2016 in Memphis, Tennessee and Lawton, Oklahoma, USA.

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