

AN ALGORITHM FOR THE NUMERICAL SOLUTION OF DIFFERENTIAL EQUATIONS OF FRACTIONAL ORDER*

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Abstract. Differential equations involving derivatives of non-integer order have shown to be adequate models for various physical phenomena in areas like damping laws, diffusion processes, etc. A small number of algorithms for the numerical solution of these equations has been suggested, but mainly without any error estimates. In this paper, we propose an implicit algorithm for the approximate solution of an important class of these equations. The algorithm is based on a quadrature formula approach. Error estimates and numerical examples are given.

Key words. Fractional derivative, Riemann-Liouville derivative, differential equation, numerical solution, quadrature formula, implicit method.

AMS subject classifications. 26A33, 65L70, 65L05.

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