

A POSTERIORI ERROR ESTIMATION FOR THE LEGENDRE COLLOCATION METHOD APPLIED TO INTEGRAL-ALGEBRAIC VOLTERRA EQUATIONS*

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Abstract. In this work, we analyze the Legendre collocation method for a mixed system of Volterra integral equations of the first and second kind which is known as Integral Algebraic Equations (IAEs). In order to obtain the approximate solution, the kernels in the system of integral equations are approximated by using the discrete Legendre expansion. A posteriori error estimate is obtained which is based on the Lebesgue constants corresponding to the Lagrange interpolation polynomials and some well-known results of orthogonal polynomials theory. The spectral rate of convergence for the described method applied to linear and nonlinear IAEs is also established in the L^2 -norm. Finally, the proposed method is illustrated by several test problems which confirm the theoretical prediction of the error estimation.

Key words. integral algebraic equations, system of Volterra integral equations, Legendre collocation method, error analysis, numerical treatments

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