Multivalue–multistage methods for the numerical solution of the nonlinear Volterra integro-differential equations

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We are going to design a numerical scheme based on the general linear methods (GLMs) for the numerical solution of a class of Volterra integro-differential equations (VIDEs). In this scheme, we construct a special class of GLMs for ODEs and combine them with Gregory quadrature rule to approximate the integral term of the underlying VIDE. The convergence and linear stability properties are analyzed. Implementation of the constructed methods on the well-known VIDEs confirms their efficiency.

Keywords: Volterra integro-differential equations, General linear methods, Gregory quadrature rule, Convergence and stability analysis.