

NUMERICAL COMPUTATION FOR SOLVING VOLTERRA INTEGRO-DIFFERENTIAL EQUATIONS WITH NEUTRAL DELAY TYPE

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ABSTRACT

Modeling phenomena in science and technology, such as mathematics, physics, population dynamics, complex systems, and biology; integro-differential equation (IDE) is of major importance. The problems listed are generally hard for researchers to solve analytically, thus a numerical method is required. The aim of this research is to produce accurate numerical results in solving neutral Volterra integro-differential equations (VIDE) with delay using hybrid block method of multistep type. The delay arguments are approximated using previously calculated values while the integration part is approximated using the quadrature rule. The proposed multistep block method in the predictor and corrector mode is derived by applying the Taylor expansion. The test problems are solved by approximating two points simultaneously using constant step size. The numerical results obtained have shown that the proposed block method is better in terms of accuracy, total steps and total function calls compared to the existing methods.

Keywords: multistep method; hybrid block method; neutral delay type, constant step-size; Volterra integro-differential equations

Note: Please underline the name of the corresponding author.