

عنوان مقاله:

A new perspective for the Quintic B-spline collocation method via the Lie-Trotter splitting algorithm to solitary wave solutions of the GEW equation

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نویسنده:

Melike Karta - Department of Mathematics, Faculty of Science and Arts, Ağır İbrahim Çeçen University, Ağır, Turkey

خلاصه مقاله:

A hybrid method utilizing the collocation technique with B-splines and Lie-Trotter splitting algorithm applied for Ψ model problems which include a single solitary wave, two solitary wave interaction, and a Maxwellian initial condition is designed for getting the approximate solutions for the generalized equal width (GEW) equation. Initially, the considered problem has been split into Ψ sub-equations as linear $U_t = \hat{A}(U)$ and nonlinear $U_t = \hat{B}(U)$ in the terms of time. After, numerical schemes have been constructed for these sub-equations utilizing the finite element method (FEM) together with quintic B-splines. Lie-Trotter splitting technique $\hat{A} \circ \hat{B}$ has been used to generate approximate solutions of the main equation. The stability analysis of acquired numerical schemes has been examined by the Von Neumann method. Also, the error norms L_2 and L_∞ with mass, energy, and momentum conservation constants I_1 , I_2 , and I_3 , respectively are calculated to illustrate how perfect solutions this new algorithm applied to the problem generates and the ones produced are compared with those in the literature. These new results exhibit that the algorithm presented in this paper is more accurate and successful, and easily applicable to other non-linear partial differential equations (PDEs) as the present equation.

کلمات کلیدی:

B-splines, Lie-Trotter splitting, Collocation method, Generalized Equal Width equation

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