

## Numerical Computation of Generalized Rosenau Regularized Long-Wave Equation via B-Spline Over Butcher's Fifth Order Runge-Kutta Approach

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**Abstract :** In this work, a septic B-spline scheme has been used to simplify the process of solving an approximate solution of the generalized Rosenau-regularized long-wave equation (GR-RLWE) with initial boundary conditions. The resulting system of first-order ODEs has dealt with Butcher's fifth order Runge-Kutta (BFRK) approach without using finite difference techniques for discretizing the time-dependent variables at each time level. Here, no transformation or any kind of linearization technique is employed to tackle the nonlinearity of the equation. Two test problems have been selected for numerical justifications and comparisons with other researchers on the basis of efficiency, accuracy, and results of the two invariants  $M_i$  (mass) and  $E_i$  (energy) of some motion that has been used to test the conservative properties of the proposed scheme.

**Keywords :** septic B-spline scheme, Butcher's fifth order Runge-Kutta approach, error norms, generalized Rosenau-RLW equation

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