Numerical solutions of time-dependent KdV type system via the Lie group method

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With the consideration of inhomogeneous media and non-uniform boundaries, the time -dependent KdV type system can be used to describe some complex and realistic phenomena. Lie group method, is one of the most powerful methods to determine exact solutions of nonlinear systems of partial differential equation. The Lie group analysis is based on reducing the number of independent variables by one. Using suitable similarity transformations, the given time-dependent KdV type system is reduced to a system of ordinary differential equations. During the procedure of reducing system of partial differential equation to systems of ordinary differential equation, we got some special highly nonlinear systems of ordinary differential equation which are not easily solvable for exact solutions. Therefore, Haar Wavelet based numerical method and classical fourth order Runge-Kutta method are applied to the reduced systems of ordinary differential equations for constructing numerical solutions of the KdV type system.