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GALERKIN METHOD FOR THE NUMERICAL SOLUTION OF THE RLW EQUATION BY USING EXPONENTIAL B-SPLINES

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In this study, We deal with the numerical solution of the regularized long wave (RLW) equation which was first introduced by Peregrine [1] for modelling the propagation of unidirectional weakly nonlinear and weakly dispersive water waves

$$u_t + u_x + \varepsilon u u_x - \mu u_{xxt} = 0 \tag{1}$$

where x is space coordinate, t is time, u is the wave amplitude and ε and μ are positive parameters. Boundary and initial conditions of the Eq.(1) are

$$\begin{array}{l} u\left(a,t\right)=\beta_1, u\left(b,t\right)=\beta_2 \\ u_x\left(a,t\right)=0,\ u_x\left(b,t\right)=0, t\in\left(0,T\right], \\ u\left(x,0\right)=f\left(x\right), x\in\left[a,b\right]. \end{array} \tag{2}$$

The exponential B-spline Galerkin method is set up to find the numerical solution of the RLW equation. Three numerical examples related to propagation of single solitary wave, interaction of two solitary waves and wave generation are employed to illustrate the accuracy and the efficiency of the method. Obtained results are compared with some early studies.

REFERENCES

[1] D. H.Peregrine. Calculations of the development of an undular bore. *J. Fluid. Mech.*, **25** (2):321–330, 1966.