

EXACT SOLUTIONS OF TWO NONLINEAR DISPERSIVE EQUATIONS WITH VARIABLE COEFFICIENTS

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Abstract. The auxiliary differential equation approach and the symbolic computation system Maple are used to investigate two nonlinear dispersive equations with variable coefficients. Under certain circumstances, the exact solutions to the equations are constructed in the forms of semi-travelling wave solutions. It is shown that the variable coefficients of the derivative terms of the equations determine the physical structures of the semi-travelling wave solutions.

Keywords. Auxiliary equation method; Exact solutions; Nonlinear equations; Variable coefficients

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References

- [1] B. Saka, Algorithms for numerical solution of the modified equal width wave equation using collocation method, *Math.Comput.Modelling*, **45**, (2007) 1096-1117.
- [2] A. Elhanbaly and M. A. Abdou, Exact travelling wave solutions for two nonlinear evolution equations using the improved F-expansion method, *Math.Comput. Modelling*, **46**, (2007) 1265-1276.
- [3] M. Tatari, M. Dehghan and M. Razzaghi, Application of the Adomian decomposition method for the Fokker-Planck equation, *Math.Comput. Modelling*, **45**, (2007) 639-650.
- [4] T. A. Abassy, M. A. Ei-Tawil and H.Ei-Zoheiry, Exact solutions of some nonlinear partial differential equations using the variational iteration method linked with Laplace transforms and the Padé technique, *Math.Comput. Modelling*, **54**, (2007) 940-954.
- [5] P. Rosenau, J. M. Hyman, Nonlinear dispersion and compact structures, *Phys. Rev. Lett.*, **70**, (1993) 564-567.
- [6] A. M. Wazwaz, Compactons, solitons and periodic solutions for some forms of nonlinear Klein-Gordon equations, *Chaos Solitons Fractals*, **28**, (2006) 1005-1013.
- [7] A. M. Wazwaz, Explicit travelling wave solutions of variants of the $K(n, n)$ and the $ZK(n, n)$ equations with compact and noncompact structures, *Appl. Math. Comput.*, **173**, (2006) 213-230.
- [8] S. Y. Lai and B. Wiwatanapataphe, The asymptotics of global solutions for semi-linear wave equations in two space dimensions, *Dynamics of Continuous, Discrete and Impulsive systems-B*, **18**, (2011) 647-657.
- [9] N. Li and S. Y. Lai, The global solutions for a shallow water equation without peakons, *Dynamics of Continuous, Discrete and Impulsive systems-B*, **19**, (2012) 337-349.
- [10] S. Y. Lai and A. Y. Wang, The global well-posedness of weak solutions for the Degasperis-Procesi equation without peakons, *Dynamics of Continuous, Discrete and Impulsive systems-B*, **20**, (2013) 33-45.
- [11] D. Kaya, S.M.El-Sayed, An application of the decomposition method for the generalized KdV and RLW equations, *Chaos Solitons Fractals*, **17**, (2003) 869-877.
- [12] A. Jeffrey, Table of integrals, Series, and Products, Fiziko-Matematicheskoy Literatury, Moscow 1963.

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