



Contents lists available at ScienceDirect

Chaos, Solitons and Fractals

journal homepage: www.elsevier.com/locate/chaos



Analytic bounded travelling wave solutions of some nonlinear equations II [☆]

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ARTICLE INFO

Article history:
Accepted 31 March 2008

ABSTRACT

Using a functional analytic method, it is proven that an initial value problem for a general class of higher order nonlinear differential equations has a unique bounded solution in the Banach space $H_1(\Delta)$ of analytic functions, defined in the open unit interval $\Delta = (-1, 1)$. This result is also used for the study of travelling wave solutions of specific nonlinear partial differential equations, such as the KdV equation, the compound KdV–Burgers equation, the Kawahara equation, the KdV–Burgers–Kuramoto–Sivashinsky equation and a 7th order generalized KdV equation. For each one of these equations, it is proven that there are analytic, bounded travelling wave solutions in the form of power series which are uniquely determined once the initial conditions are given. The method described in this paper verifies all the travelling wave solutions of these equations which have also appeared in recent papers.

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