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TOPOLOGICAL AND NON-TOPOLOGICAL SOLITONS OF THE GENERALIZED KLEIN-GORDON EQUATIONS IN 1+2 DIMENSIONS

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Abstract. This paper studies the generalized nonlinear Klein-Gordon equations in 1+2 dimensions. There are five forms of nonlinearity that are considered in this paper. The solitary wave ansatz is used to carry out the integration of these five forms. Both topological and non-topological soliton solutions are obtained depending on the nonlinear form.

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Key words: solitons; integrability; integrals of motion.

1 Introduction

The nonlinear Klein-Gordon equation (KGE) has been one of the research areas in Theoretical Physics for a fairly long time [1-10]. In particular, it appears in Quantum Mechanics. Recently, there has been an interest in the study of KGE in 1+2 dimensions. In this paper the focus is going to be on the soliton solutions of the generalized KGE (gKGE) in 1+2 dimensions. Recently, the study of generalized KGE in (gKGE) 1+1 dimensions has been conducted [7-10]. This paper will extend that study to 1+2 dimensions.

KGE is an example of nonlinear evolution equation. There has been a lot of progress in the area of nonlinear evolution equations. Many nonlinear evolution equations have been integrated by various modern methods of integrability, which were otherwise concluded to be non-integrable by the Painleve