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Completeness study on certain 2×2 partial difference equation Lax pairs

Michael Hay

School of Mathematics and Statistics
University of Sydney
Carslaw Building F07
Camperdown, NSW 2006
AUSTRALIA

hay.michael.c@gmail.com

Abstract

We present a study that begins with Lax pairs for partial difference equations that are 2×2 , where each entry of the Lax matrices contains only one separable term. Besides that the terms are general, no ansatz is made about the dependence on the spectral parameter, nor about the terms dependent on the lattice variables. We examine all possible groups of equations that can arise via the compatibility condition. Once a system of equations is extracted from the compatibility condition, it is solved in a way that preserves its generality, up to a point where nonlinear evolution equations are apparent, or the system is shown to be trivial.