

Exact solutions of completely integrable systems and linear ODE's having elliptic function coefficients

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Abstract

We present an algorithm for finding closed form solutions in elliptic functions of completely integrable systems. First we solve the linear differential equations in spectral parameter of Hermite-Halphen type. The integrability condition of the pair of equations of Hermite-Halphen type gives the large family of completely integrable systems of Lax-Novikov type. This algorithm is implemented on the basis of the computer algebra system MAPLE. Many examples, such as vector nonlinear Schrödinger equation, optical cascaded equations and restricted three wave system are considered. New solutions for optical cascaded equations are presented. The algorithm for linear ODE's with elliptic functions coefficients is generalized to 2×2 matrix equations with elliptic coefficients.