SOLITARY SOLUTIONS OF COUPLED KdV AND HIROTA–SATSUMA DIFFERENTIAL EQUATIONS

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Abstract. By considering the set of coupled KdV differential equations as a zero curvature representation of some fourth order linear differential equation and factorizing the linear differential equation, the hierarchy of solutions of the coupled KdV differential equations have been obtained from the eigen spectrum of constant potentials.

1. Introduction

The cKdV (coupled Korteweg–de Vries) equation is a generic example of N-component systems, energy dependent Schrödinger operators and bi-Hamiltonian structures for multi-component systems [3, 4]. Quasi-periodic and soliton solution are studied in connection with Hamitonian systems on Riemann surface in [1]. The soliton fission effect, kink to anti-kink transitions, and multi-peaked solitons extend to equations that model physical phenomena. The classical Boussinesq system and the equations governing second harmonic generation (SHG) are each connected to the cKdV system through nonsingular transformations [2]. Direct application of these transformations enables solutions of cKdV system to be interpreted in the context of these related equations. A connection between the SHG system and the cKdV system has been recently discussed [2, 14]. Therefore, in this work because of more importance of cKdV systems, we consider two kind of integrable cKdV system [5, 10] and solve them using the factorization method that it is somehow similar to