1125-35-2467 **Yuan Zhou*** (zhouy@mail.usf.edu), Department of Mathematics and Statistics, University of South Florida, 4202 East Fowler Ave, Tampa, FL 33620, and **Wen-Xiu Ma**. *Quasi-period solutions to reduced DKN hierarchy.*

In our recent paper, we studied the reduced D-Kaup–Newell spectral problems from $sl(2,\mathbb{R})$, and established a hierarchy of commuting bi-Hamiltonian soliton equations by zero curvature equations and we also explicitly computed their hereditary recursion operators.

In this paper, we discuss a new spectral problem: $\phi_x = U(\lambda, p, q)\phi$ which possesses the same soliton hierarchy as the reduced D-Kaup–Newell spectral problems. With the aid of the Lax matrix, we introduce an hyperelliptic curve of arithmetic genus n: $\mathcal{K}_n = \{(\lambda, y) : y^2 - R(\lambda) = 0\}$, where R is a monic polynomial of degree $2n+2$.

In order to formulate algebro-geometric solutions to the soliton hierarchies in terms of the Riemann theta functions, we develop a scheme to determine Dubrovin type equations for zeros and poles of meromorphic functions. We straighten out all flows in soliton hierarchies under the Abel-Jacobi coordinates associated with Lax pairs, and study the asymptotic behaviors of the Baker-Akhiezer functions. Finally, we succeed in finding the theta function representations of the potentials p and q. (Received September 20, 2016)