Title: On the separation of variables for the two-dimensional integrable system with velocity-dependent potential

Short Abstract:

We are working within a scope of applying transformations of bi-Hamiltonian structure to classify known integrable systems and to find new ones. Following the paper [1], the equations analogous to Bäcklund transformations were shown to be connected with the form of Lax matrix and can be explicitly derived from it. For some finite-dimensional integrable systems, there exists a similarity transformation $\hat{L} = VLV^{-1}$ which yields matrix $\hat{L}$ linked to the two integrals of motion of the system through its spectral curve C and two families of separation variables through its off-diagonal elements. Introducing an adequate number of unknown parameters in the components of the Lax matrix and taking into account a set of relations needed to get Bäcklund transforms from it, we can construct a new integrable system with velocity-dependent potential.

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References

[1] A. V. Tsiganov, *On auto and hetero Bäcklund transformations for the Hénon–Heiles systems.* Phys. Lett. A 379 (2015) 2903–2907