

Transfer of integrable structures of soliton hierarchies to integrable Newton equations.

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In 1990-ties I have in collaboration with M.Antonowicz, P.Kulish, S.Orlov developed technique of transferring integrable structures of soliton hierarchies to finite dimensional invariant manifolds defined as stationary/restricted flows. They are systems of ODE's that, after suitable parametrisation, acquire form of Newton equations with velocity independent forces.

Structures of integrable hierarchies such as bi-hamiltonian formulation, Lax representation, Miura transformation, r-matrix give rise to corresponding structures for 2nd order ODE's being stationary and restricted flows. These structures were interesting by their own and gave rise to further, new classes of integrable ODE's of mechanical type.

These results have been largely forgotten and the purpose of this talk is to bring them again to light as there are still many new results about integrability of Newton equations to be found there. I shall illustrate this approach by discussing 2 simple examples: the stationary KDV equation and the Garnier system of motion of a particle in a quartic potential.

Reference.

“Mechanical systems related to the Schrödinger spectral problem”

S Rauch-Wojciechowski - Chaos, Solitons & Fractals, December 1995

Presenter: RAUCH, Stefan (Department of Mathematics, Linköping University)