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Integrable non-abelian Laurent ODEs

After giving examples of integrable matrix homogeneous ODE-systems we discuss non-abelian Laurent polynomials and an ODE-system of Kontsevich which we study for its integrability. As a step towards the classification of such ODE systems we investigate Laurent deformations of the integrable Mikhailov-Sokolov system $u_t = uv,\ v_t = -vu$. All such deformations of inhomogeneous degree 2 with symmetries of inhomogeneous degree 4 have been computed.

The symmetry investigation of the Kontsevich system that was performed includes the determination of Lax Pairs of which 10 were found, each providing an infinite sequence of conservation laws and of symmetries. It also includes the direct computation of all inhomogeneous symmetries up to degree 15. The corresponding linear algebraic systems that have been solved contain up to 300 million equations for 59 million undetermined coefficients.