LAX OPERATOR ALGEBRAS AND RELATED STRUCTURES

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Lax operator algebras are Lie algebras of currents defined on Riemann surfaces and taking values in semi-simple or reductive Lie algebras. They are introduced in 2007 (I. Krichever and O. Sh.). In many respects, Lax operator algebras are similar to Kac – Moody algebras. Non-twisted Kac – Moody algebras are Lax operator algebras on Riemann sphere with marked points at 0, and infinity. Up to the end of 2013 Lax operator algebras have been defined and constructed only for classical Lie algebras, and for the exceptional Lie algebra G_2. A natural, and long standing question of their general construction in terms of root systems has been resolved in the beginning of 2014. It is a pleasant duty of the author to stress the role of E.B. Vinberg in the discussion of the question.

The general definition shed new light at the relations between Lax operator algebras, finite-dimensional integrable systems, and holomorphic vector bundles on Riemann surfaces. It turned out to be that all these structures have the same basis related to gradings of semisimple Lie algebras.

In the talk, we are going to give a general definition of Lax operator algebras in terms of gradings of semi-simple Lie algebras, formulate their basic properties. We are to state a connection with Tyurin parameters of holomorphic vector bundles on Riemann surfaces, and formulate a general approach to construction of finite-dimensional integrable systems based on this approach.

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