Taimanov, I. A.
Singular spectral curves in finite-gap integration. (English. Russian original) Zbl 1235.37024
Russ. Math. Surv. 66, No. 1, 107-144 (2011); translation from Usp. Mat. Nauk. 66, No. 1, 111-150 (2011).

This article is an expanded version of the report given by the author at the conference Geometry, Dynamics, Integrable Systems (GPIS) in 2010. It concerns the description of two examples studied by the author in joint work with *A. E. Mironov* ["Orthogonal curvilinear coordinate systems corresponding to singular spectral curves", Proc. Steklov Inst. Math. 255, No. 1, 169–184 (2006)], which demonstrate how singular spectral curves arise in integrable problems in differential geometry. In the construction of finite-gap orthogonal curvilinear coordinate systems and solutions of the associativity equation [*I. M. Krichever*, Funct. Anal. Appl. 31, No. 1, 25–39 (1997); translation from Funkts. Anal. Prilozh. 31, No. 1, 32–50 (1997; Zbl 1004.37052)] it is natural to consider the degenerate case when the geometric genus of a singular spectral curve is equal to zero [Mironov and the author, loc. cit.].

In this case the construction of the Baker-Akhiezer function and of finite-gap solutions reduces to solving linear systems, the solutions themselves are expressed in terms of elementary functions, and, in particular, one obtains solutions of the associativity equations satisfying quasi-homogeneity conditions, which yields an analytic construction of infinitely many previously unknown Frobenius manifolds.

It turns out that for solution equations with self-consistent sources, the spectral curve can be deformed and a deformation reduces to the creation and annihilation of double points [*P. G. Grinevich* and the author, Int. Math. Res. Not. 2007, No. 2, Article ID rnm005, 21 p. (2007; Zbl 1141.53009)].

Reviewer: Svetlana A. Grishina (Ul'yanovsk)

MSC:

37K20	Relations of infinite-dimensional Hamiltonian and Lagrangian dynamical systems with algebraic geometry, complex analysis, and special functions	Cited in **3** Documents
37K25	Relations of infinite-dimensional Hamiltonian and Lagrangian dynamical systems with topology, geometry and differential geometry	
35Q53	KdV equations (Korteweg-de Vries equations)	

Keywords:

finite-gap integration; non-linear equations; Riemann surfaces; singular algebraic curves

Full Text: DOI arXiv