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Fredholm determinant and Nekrasov type representations for isomonodromic tau functions

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We will derive Fredholm determinant representation for isomonodromic tau functions of Fuchsian systems with n regular singular points on the Riemann sphere and generic monodromy in $\mathrm{GL}(N, C)$. The corresponding operator acts in the direct sum of $N(n-3)$ copies of $L^2(S^1)$. Its kernel is expressed in terms of fundamental solutions of $n-2$ elementary 3-point Fuchsian systems whose monodromy is determined by monodromy of the relevant n-point system via a decomposition of the punctured sphere into pairs of pants. For $N = 2$ these building blocks have hypergeometric representations, the kernel becomes completely explicit and has Cauchy type. In this case Fredholm determinant expansion yields multivariate series representation for the tau function of the Garnier system obtained earlier via its identification with Fourier transform of Liouville conformal block (or a dual Nekrasov-Okounkov partition function). Further specialization to $n = 4$ gives a series representation of the general solution to Painlevé VI equation.

Summary

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