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Isomonodromy aspects of the tt^* equations of Cecotti and Vafa. Iwasawa factorization and asymptotics.

Tuesday, June 29, 2021 5:00 PM (40 minutes)

In this talk the results concerning the global asymptotic analysis of the tt^* - Toda equation,

$$2(w_i)_{t\bar{t}} = -e^{2(w_{i+1}-w_i)} + e^{2(w_i-w_{i+1})},$$

where, for all i , $w_i = w_{i+4}$ (periodicity), $w_i = w_i(|t|)$ (radial condition), and $w_i + w_{-i-1} = 0$ ("anti-symmetry"), will be presented.

The problem has been intensively studied since the early 90s work of Cecotti and Vafa. In these work a prominent role of the tt^* equations in the classification of supersymmetric field theories had been revealed and a series of important conjectures about their solutions has been formulated. We study the question using a combination of methods from PDE, isomonodromic deformations (Riemann-Hilbert method), and loop groups (Iwasawa factorization). We place these global solutions into the broader context of solutions which are smooth near 0. For such solutions, we compute explicitly the Stokes data and connection matrix of the associated meromorphic system, in the resonant cases as well as in the non-resonant case. This allows us to give a complete picture of the monodromy data, holomorphic data, and asymptotic data of the global solutions.

This is a joint work with Martin Guest and Chang-Shou Lin.

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