Free fermionic approach to the KP and two-dimensional Toda-lattice hierarchies

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Abstract

In this talk, a survey on the free fermionic approach to the KP and two-dimensional Toda-lattice (2DTL) hierarchies will be given based on the collective works by Date, Jimbo, Kashiwara, Miwa, Takasaki and Takebe. First, we will show how the bilinear identities, as well as their Gram-type solutions, are obtained by embedding the infinite dimensional Lie algebras in the context of free fermions. Then, we will also show both the continuous and discrete soliton equations such as the KdV and the mKdV equations, Hirota-Miwa equation, and fully discrete analogue to the 2DTL lattice equations can be obtained from these generic bilinear identities.