On the Occasion of 60th Birth Day of Prof. Kotani

Correlation Functions of Vertices in a Random Matrix Theory

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Abstract

The correlation functions of vertices in random matrix theory , i.e. operator products of the form $< \prod_{i=1}^{n} \frac{1}{N} \mathrm{tr} M^{k_i} >$, are calculated in a $\frac{1}{N}$ expansion. For large values of the powers k_i, in an appropriate scaling limit relating large k's to large N, universal scaling functions are derived. The universality is checked by considering Gaussian distributions with an external matrix source. This question is related to Kontsevich's work on the intersection numbers of the moduli space of curves, as shown here with the help of the replica method.