Voros coefficients for hypergeometric differential equations and Eynard-Orantin's topological recursion

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This talk is based on a joint work with K. Iwaki and T. Koike ([3]).

Exact WKB analysis is a powerful tool to study global behavior of solutions of differential equations and Voros coefficients play an important role in performing such a global study through exact WKB analysis.

On the other hand, the topological recursion is introduced by B. Eynard and N. Orantin ([2]) to study the correlation functions in the random matrix theory and it gives a generalization of the loop equations for the matrix model.

Recently, a surprising connection between exact WKB analysis and topological recursion has been discovered, that is, it is discovered that WKB solutions are constructed via the topological recursion ([1]).

In this talk, we prove that the Voros coefficients for hypergeometric differential equations are described by the generating functions of free energies defined in terms of the topological recursion. Furthermore, as its applications we show the following objects can be computed in an explicit manner: (i) three-term difference equations that the generating function of the free energies satisfies, (ii) concrete form of the free energies, and (iii) Voros coefficients for hypergeometric equations.

References

[1] Bouchard, V. and Eyanard, B., Reconstructing WKB from topological recursion, *Journal de l'Ecole polytechnique – Mathematiques*, **4** (2017), pp. 845–908.

[2] Eynard, B. and Orantin, N., Invariants of algebraic curves and topological expansion, *Communications in Number Theory and Physics*, **1** (2007), pp. 347–452; arXiv:math-ph/0702045.

[3] Iwaki, K. , Koike, T. and Takei, Y., Voros coefficients for the hypergeometric differential equations and Eynard-Orantin's topological recursion, arXiv:1805.10945.