

Deformations of OP ensembles and finite temperature Sine kernel

THOMAS CHOUTEAU, CAIO CANDIDO, VÍCTOR ALVES, CHARLES SANTOS, GUILHERME SILVA

ICMC, Universidade de São Paulo

thomas.chouteau@usp.br

Resumen. We study deformations of Orthogonal Polynomial Ensembles [2] in the regime of a large number of particles. The deformations we introduce affect the local fluctuations of the ensemble around a bulk point of the limiting spectrum. We identify the limiting kernel and express it in terms of the solution to an integrable non-local differential equation related to the Painlevé V equation. This new kernel arises as the correlation kernel of a conditionally thinned process built from the Sine point process, and it is also connected to a finite-temperature deformation of the Sine kernel recently studied by Claeys and Tarricone[1]. Finally, we investigate the effect of the deformation on the recurrence coefficients of the associated orthogonal polynomials, which exhibit oscillatory behavior even in a one-cut regular setting for the limiting spectrum.

Palabras clave: Determinantal Point Processes; Orthogonal polynomials; Asymptotics; Integrable equations.

Referencias

- [1] T. Claeys, S. Tarricone, (2024). On the integrable structure of deformed sine kernel determinants. *Math. Phys. Anal. Geom.*, 27(1), Paper No. 3,35.
- [2] P. Ghosal, G. Silva, (2022). Universality for multiplicative statistics of Hermitian random matrices and the integro-differential Painlevé II equation. *Comm. Math. Phys.*, 97(3):1237-1307.
- [3] N. N. Yanenko (1971) *The method of fractional steps. The solution of problems of mathematical physics in several variables*. Springer.
- [4] G. A. Staff, E. M. Rønquist (2005). Stability of the Parareal Algorithm, en T. J. Barth et al., editores, *Domain Decomposition Methods in Science and Engineering*, Lect. Notes Comput. Sci. Eng., vol. 40, Springer-Verlag, 449–456.

Agradecimientos. Proyecto parcialmente financiado por São Paulo Research Foundation (FAPESP), Brazil. Process Numbers #2023/10533 – 8 and #2025/06240 – 0.

Indicar la preferencia (subrayar la opción elegida): póster o charla.

Indicar la preferencia (subrayar la opción elegida): Lunes/Martes o Jueves/Viernes.