Cores of Dirichlet forms related to Random Matrix Theory

Hirofumi Osada (Kyushu), Hideki Tanemura (Chiba)

We prove the sets of polynomials on configuration spaces are cores of Dirichlet forms describing interacting Brownian motions in infinite dimensions. Typical examples of these stochastic dynamics are Dyson's Brownian motion and Airy interacting Brownian motion. Both particle systems have logarithmic interaction potentials, and naturally arise from random matrix theory.

The results above are used to prove the identity of the infinite-dimensional stochastic dynamics related to the random matrix theories constructed by apparently different methods: the method of space-time correlation functions and that of stochastic analysis.

We also use these results to prove the identity of Dirichlet forms describing the solutions of infinite-dimensional stochastic differential equations constructed by Lang and Osada. These solutions are limits of finite particle systems endowed with different boundary conditions.

References

[1] Osada, H., *Dirichlet form approach to infinite-dimensional Wiener processes with singular interactions*, Commun. Math. Phys. **176**, 117-131 (1996).

[2] Osada, H., *Interacting Brownian motions in infinite dimensions with logarithmic interaction potentials*, Ann. of Probab. **41**, 1-49 (2013).

[3] Osada, H., Tanemura, H., *Cores of Dirichlet forms related to Random Matrix Theory*, arXiv:1405.4304 [math.PR]

[4] Osada, H., Tanemura, H., *Infinite-dimensional stochastic differential equations arising from Airy random point fields*, arxiv:1408.0632

[5] Osada, H., Tanemura, H., *Infinite-dimensional stochastic differential equations and tail σ-fields*, preprint.

[6] Osada, H., Tanemura, H., *Strong Markov property of determinantal processes with extended kernels*, preprint.