A kinetic model approximation of Walsh's spider process on star-like graph

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We consider processes of deterministic motions on k copies of a star-like graph $K_{1,k}$ with k edges which are perturbed by two stochastic mechanisms: one reflecting interfaces located at the graphs' centers, the other describing jumps between different copies of the same edge. We prove, extending the main result of [1], that diffusing scaling of these processes leads in the limit to the Walsh's spider process on $K_{1,k}$.

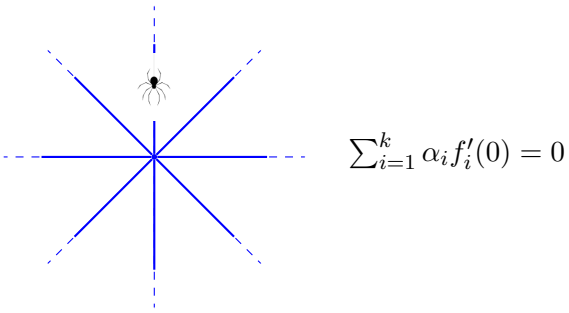

Figure 1: The infinite star-like graph $K_{1,k}$ with $k = 8$ edges. Walsh's spider process on $K_{1,k}$ is a Feller process whose behavior at the graph's center is characterized by the boundary condition visible above; outside of the center the process behaves like a standard one-dimensional Brownian motion.

References

[1] A. Bobrowski and T. Komorowski. *Diffusion approximation for a simple kinetic model with asymmetric interface.* J. Evol. Equ., 22:42, 2022.

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