

Levy-Chentsov surfaces and hard rod hydrodynamics

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We consider a Poisson line process in the plane, and associate a step with each line to obtain a random surface. The diffusive scaling of the surface converges to the Lévy-Chentsov field, a classical Gaussian field, also called Brownian motion with several parameters. A hard rod is an interval contained in $\mathbb{R}$ that travels ballistically until it collides with another hard rod, at which point they interchange positions. By associating each line with the ballistic displacement of a hard rod and surface steps with hard rod jumps, we map the hard rod system to the random surface. The mapping is then used to obtain hydrodynamic limits of the hard rods in the Euler and diffusive scalings.

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