

From the KPZ fixed point to the directed landscape

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Two central objects in the KPZ universality class are the KPZ fixed point (KPZ FP) and the directed landscape (DL), which are the scaling limits of the growth process and directed metric, respectively. It is known that KPZ FP gives marginals of DL, and DL is a natural coupling of multiple instances of KPZ FP. We show that DL is the unique process with KPZ FP as its marginals, satisfying four natural properties: independent increments, a semigroup structure, monotonicity, and shift commutativity. This gives a characterization of DL, and provides a framework for proving convergence to DL given KPZ FP convergence. We apply this framework to prove various processes converge to DL: 1D exclusion processes with potentially non-nearest neighbor interactions, exotic couplings of ASEP, the Brownian web and random walk web distance, and directed polymers. In particular, we give new proofs of DL convergence for colored ASEP and the KPZ equation. This is a joint work with Duncan Dauvergne.

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