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Stochastic flows of kernels in the Brownian web and the Brownian net.

Abstract: We identify a suitable scaling limit of one-dimensional random walks in i.i.d. space-time random environment as a stochastic flow of kernels in the Brownian net and the Brownian web. The notion of stochastic flows of kernels was introduced by Le Jan and Raimond, where they showed that each consistent family of n-point motions gives rise to a stochastic flow of kernels, which can be loosely interpreted as the transition kernels of a random motion in a random environment with independent innovations. They constructed a specific class of flows on R, which was recently generalized by Howitt and Warren to a much larger class we call the Howitt-Warren flows, where the n-point motions are sticky Brownian motions that arise as the scaling limit of the n-point motions for random walks in i.i.d. space time random environments. Here we give a graphical construction of the underlying environment for the Howitt-Warren flow in terms of the Brownian net (resp. the Brownian web), which loosely speaking consists of a collection of branching-coalescing (resp. coalescing) Brownian motions starting from every point in the space-time plane. Almost sure path properties for the Howitt-Warren flow are derived based on the graphical construction. This is based on joint work with Jan M. Swart (UTIA, Prague) and Emmanuel Schertzer (Columbia, New York).