Sample-dependent first-passage time distribution in a disordered medium

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Above two dimensions, diffusion of a particle in a medium with quenched random traps is believed to be well-described by the annealed continuous time random walk (CTRW). We propose an approximate expression for the first-passage-time (FPT) distribution in a given sample that enables detailed comparison of the two problems. For a system of finite size, the number and spatial arrangement of deep traps yield significant sample-to-sample variations in the FPT statistics. Numerical simulations of a quenched trap model with power-law sojourn times confirm the existence of two characteristic time scales and a non-self-averaging FPT distribution, as predicted by theory.