

INVARIANCE PRINCIPLE FOR THE RANDOM CONDUCTANCE MODEL
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We consider a time continuous random walk $(X_t, t \geq 0)$ on \mathbb{Z}^d in random environment generated by

$$L^\omega F(x) = \sum_{b=(x,y)} \omega(b)(F(y) - F(x)),$$

where $\omega = (\omega(b))_{b=(x,y) \in \mathbb{Z}_*^d}$ is the symmetric environment (\mathbb{Z}_*^d are the non-oriented nearest neighbor bonds of \mathbb{Z}^d), and denote for fixed ω by P_0^ω the law of this random walk starting at 0.

We assume that $(\omega(b))_{b \in \mathbb{Z}_*^d}$ are i.i.d. and satisfy

$$\mathbb{P}(\omega(b) = 0) < 1 - p_c$$

where p_c is the bond percolation on \mathbb{Z}^d associated with $1_{\omega(b) > 0}$. Next consider the rescaled process

$$X_t^{(\epsilon)} = \epsilon X_{t/\epsilon^2}, \quad t \geq 0,$$

and the probability

$$\mathbb{P}_0(\cdot) = \mathbb{P}(\cdot | 0 \in \mathcal{C})$$

where \mathcal{C} is the infinite percolation cluster.

We then show a quenched invariance principle for $X^{(\epsilon)}$ as $\epsilon \searrow 0$, that is for \mathbb{P}_0 almost all ω , $X^{(\epsilon)}$ converges under P_0^ω in law to a Brownian motion with positive variance.

Our proof is based on a time change argument, restricting the process to the region where the rates are bounded from above and below, and on heat kernel estimates.

This is a joint work with Sebastian Andres, Martin Barlow, and Ben Hambly.