Optimal Flow through the Disordered Lattice

Abstract. After general remarks on the topic of flows through random networks, I will outline a proof of the following result. Consider routing traffic on the $N \times N$ torus, simultaneously between all source-destination pairs, to minimize the cost $\sum_{e} c(e)f^2(e)$, where $f(e)$ is the volume of flow across edge $e$ and the $c(e)$ form an i.i.d. random environment. One can prove existence of a rescaled $N \to \infty$ limit constant for minimum cost, by comparison with an appropriate analogous problem about minimum-cost flows across a $M \times M$ subsquare of the lattice.