NEAR-MINIMAL SPANNING TREES: A SCALING EXPONENT IN PROBABILITY MODELS

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We study the relation between the minimal spanning tree (MST) on many random points and the “near-minimal” tree which is optimal subject to the constraint that a proportion $\delta$ of its edges must be different from those of the MST. Heuristics suggest that, regardless of details of the probability model, the ratio of lengths should scale as $1 + \Theta(\delta^2)$. We prove this scaling result in the model of the lattice with random edge-lengths and in the 2-dimensional Euclidean model.