



# Renormalization group treatment of rigidity percolation

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Renormalization group calculations are used to give exact solutions for rigidity percolation on hierarchical lattices. Algebraic scaling transformations for a simple example in two dimensions produce a transition of second order, with an unstable critical point and associated scaling laws. Values are provided for the order parameter exponent  $\beta = 0.0775$  associated with the spanning rigid cluster and also for  $\nu = 3.533$  which is associated with an anomalous lattice dimension  $d$  and the divergence in the correlation length near the transition. In addition we argue that the number of floppy modes  $F$  plays the role of a free energy and hence find the exponent  $\alpha$  and establish hyperscaling. The exact analytical procedures demonstrated on the chosen example readily generalize to wider classes of hierarchical lattice.

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