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Finding Hamilton Cycles in Random Cubic Graphs

We consider the problem of finding a Hamilton cycle in a graph G drawn at random from the set of labeled cubic graphs of order $2n$. In 1996 Frieze *et al.* showed that with high probability the expected number of independent random 2-factors of G needed to yield a Hamilton cycle is $O(n^{5/2})$.

A more careful analysis reveals that over a class containing almost all cubic graphs (as $n \to \infty$) this expectation is asymptotic to $Cn^{1/2}$ for a constant $C = 0.56802636\ldots$. This suggests an algorithm which intuitively should find a Hamilton cycle in time $O(n^{3/2})$ with high probability. Supporting evidence for such performance is provided by data from experiments carried out by Mei Xue while an M.S. student at The University of Georgia.