

GENERATING 4-REGULAR HAMILTONIAN PLANE GRAPHS

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Abstract

This paper describes the study of a special class of 4-regular plane graphs which are Hamiltonian. These graphs are of special interest in knot theory. An algorithm is presented that randomly generates such graphs with n vertices with a fixed (and oriented) Hamiltonian cycle in $O(n)$ time. An exact count of the number of such graphs with n vertices is obtained and the asymptotic growth rate of this number is determined. Numerical evidence is presented to show that the algorithm can be modified to generate these graphs with a near uniform probability. This can be considered as a first step in generating large random knots without bias.

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