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Hamiltonian cycles in solid grid graphs

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C. Umans ; W. Lenhart All Authors

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Abstract:

A grid graph is a finite node induced subgraph of the infinite two dimensional integer grid. A solid grid graph is a grid graph without holes. For general grid graphs, the Hamiltonian cycle problem is known to be NP complete. We give a polynomial time algorithm for the Hamiltonian cycle problem in solid grid graphs, resolving a longstanding open question posed by A. Itai et al. (1982). In fact, our algorithm can identify Hamiltonian cycles in quad quad graphs, a class of graphs that properly includes solid grid graphs.

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