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**An approximation algorithm for the longest cycle problem in solid grid graphs.** (English)

Zbl 1333.05091

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Summary: Although, the Hamiltonicity of solid grid graphs are polynomial-time decidable, the complexity of the longest cycle problem in these graphs is still open. In this paper, by presenting a linear-time constant-factor approximation algorithm, we show that the longest cycle problem in solid grid graphs is in APX. More precisely, our algorithm finds a cycle of length at least  $\frac{2n}{3} + 1$  in 2-connected  $n$ -node solid grid graphs.

**MSC:**

05C12 Distance in graphs

05C38 Paths and cycles

05C45 Eulerian and Hamiltonian graphs

05C85 Graph algorithms (graph-theoretic aspects)

68W25 Approximation algorithms

Cited in 4 Documents

**Keywords:**

longest cycle; Hamiltonian cycle; approximation algorithm; solid grid graph

**Full Text:** [DOI](#) [arXiv](#)

**References:**

- [1] Alon, Noga; Yuster, Raphael; Zwick, Uri, Color-coding, *J. ACM*, 42, 4, 844-856, (1995) · [Zbl 0885.68116](#)
- [2] Bansal, Nikhil; Fleischer, Lisa~K.; Kimbrel, Tracy; Mahdian, Mohammad; Schieber, Baruch; Sviridenko, Maxim, Further improvements in competitive guarantees for QoS buffering, (Proceedings of the International Colloquium on Automata, Languages and Programming, (2004), Springer), 196-207 · [Zbl 1098.68516](#)
- [3] Björklund, Andreas; Husfeldt, Thore, Finding a path of superlogarithmic length, *SIAM J. Comput.*, 32, 6, 1395-1402, (2003) · [Zbl 1041.68066](#)
- [4] Björklund, Andreas; Husfeldt, Thore; Khanna, Sanjeev, Approximating longest directed paths and cycles, (Proceedings of the International Colloquium on Automata, Languages and Programming, (2004), Springer), 222-233 · [Zbl 1098.68094](#)
- [5] Bulterman, R. W.; van~der Sommen, F. W.; Zwaan, G.; Verhoeff, T.; van Gasteren, A. J.M.; Feijen, W. H.J., On computing a longest path in a tree, *Inform. Process. Lett.*, 81, 2, 93-96, (2002) · [Zbl 1032.68671](#)
- [6] Chen, Guantao; Gao, Zhicheng; Yu, Xingxing; Zang, Wenan, Approximating longest cycles in graphs with bounded degrees, *SIAM J. Comput.*, 36, 3, 635-656, (2006) · [Zbl 1118.05047](#)
- [7] Feder, Tomás; Motwani, Rajeev, Finding large cycles in Hamiltonian graphs, (Proceedings of the 16th annual ACM-SIAM symposium on Discrete Algorithms, (2005), Society for Industrial and Applied Mathematics), 166-175 · [Zbl 1297.05140](#)
- [8] Gabow, Harold~N., Finding paths and cycles of superpolylogarithmic length, *SIAM J. Comput.*, 36, 6, 1648-1671, (2007) · [Zbl 1135.68044](#)
- [9] Gabow, Harold~N.; Nie, Shuxin, Finding a long directed cycle, *ACM Trans. Algorithms*, 4, 1, (2008), 7:1-7:21 · [Zbl 1183.05078](#)
- [10] Gabow, Harold~N.; Nie, Shuxin, Finding long paths, cycles and circuits, (Proceedings of the 19th annual International Symposium on Algorithms and Computation, (2008), Springer), 752-763 · [Zbl 1183.05078](#)
- [11] Gutin, G., Finding a longest path in a complete multipartite digraph, *SIAM J. Discrete Math.*, 6, 2, 270-273, (1993) · [Zbl 0773.05071](#)
- [12] Ioannidou, Kyriaki; Mertzios, George~B.; Nikolopoulos, Stavros~D., The longest path problem is polynomial on interval graphs, (Proceedings of 34th International Symposium on Mathematical Foundations of Computer Science, (2009), Springer), 403-414 · [Zbl 1250.68128](#)
- [13] Itai, A.; Papadimitriou, C. H.; Szwarcfiter, J. L., Hamiltonian paths in grid graphs, *SIAM J. Comput.*, 11, 4, 676-686, (1982) · [Zbl 0506.05043](#)
- [14] Karger, David; Motwani, Rajeev; Ramkumar, G. D.S., On approximating the longest path in a graph, *Algorithmica*, 18, 1, 82-98, (1997) · [Zbl 0876.68083](#)
- [15] Kehsavarz~Kohjerdi, F.; Bagheri, A.; Asgharian~Sardroud, A., A linear-time algorithm for the longest path problem in rectangular grid graphs, *Discrete Appl. Math.*, 160, 3, 210-217, (2012) · [Zbl 1237.05115](#)

- [16] Mertziotis, George~B.; Corneil, Derek~G., A simple polynomial algorithm for the longest path problem on cocomparability graphs, *SIAM J. Discrete Math.*, 26, 3, 940-963, (2012) · [Zbl 1256.05237](#)
- [17] Uehara, Ryuhei; Uno, Yushi, Efficient algorithms for the longest path problem, (Proceedings of the 15th annual International Symposium on Algorithms and Computation, (2004), Springer), 871-883 · [Zbl 1116.05318](#)
- [18] Uehara, R.; Uno, Y., On computing longest paths in small graph classes, *Internat. J. Found Comput. Sci.*, 18, 05, 911-930, (2007) · [Zbl 1202.68291](#)
- [19] Umans, C.; Lenhart, W., Hamiltonian cycles in solid grid graphs, (Proceedings of 38th Annual Symposium on Foundations of Computer Science, (1997), IEEE), 496-505
- [20] Zhang, W.; Liu, Y., Approximating the longest paths in grid graphs, *Theoret. Comput. Sci.*, 412, 39, 5340-5350, (2011) · [Zbl 1222.68089](#)

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