

MINIMAL GRAPHS WITH RESPECT TO GEOMETRIC DISTANCE REALIZABILITY

TOMÁŠ MADARAS

AND

PAVOL ŠIROCZKI

Institute of Mathematics
P.J. Šafárik University in Košice
Jesenná 5, 04001 Košice, Slovakia

e-mail: tomas.madaras@upjs.sk
siroczi@gmail.com

Abstract

A graph G is minimal non-unit-distance graph if there is no drawing of G in Euclidean plane having all edges of unit length, but, for each edge e of G , $G - e$ has such a drawing. We prove that, for infinitely many n , the number of non-isomorphic n -vertex minimal non-unit-distance graphs is at least exponential in n .

Keywords: unit-distance graph, odd-distance graph, Euclidean plane.

2010 Mathematics Subject Classification: 05C62.

REFERENCES

- [1] N. Alon and A. Kupavskii, *Two notions of unit distance graphs*, J. Combin. Theory Ser. A **125** (2014) 1–17.
doi:10.1016/j.jcta.2014.02.006
- [2] P. Erdős, F. Harary and W.T. Tutte, *On the dimension of a graph*, Mathematika **12** (1965) 118–122.
doi:10.1112/S0025579300005222
- [3] R.L. Graham, B.L. Rothschild and E.G. Strauss, *Are there $n + 2$ points in \mathbb{E}^n with odd integral distances?*, Amer. Math. Monthly **81** (1974) 21–25.
doi:10.1080/00029890.1974.11993491

- [4] B. Horvat, J. Kratochvíl and T. Pisanski, *On the computational complexity of degenerate unit distance representations of graphs*, Lecture Notes in Comput. Sci. **6460** (2011) 274–285.
doi:10.1007/978-3-642-19222-7_28
- [5] V.P. Korzhik and B. Mohar, *Minimal obstructions for 1-immersions and hardness of 1-planarity testing*, J. Graph Theory **72** (2013) 30–71.
doi:10.1002/jgt.21630
- [6] K. Kuratowski, *Sur le problème des courbes gauches en topologie*, Fund. Math. **15** (1930) 271–283.
doi:10.4064/fm-15-1-271-283
- [7] L. Piepmeyer, *The maximum number of odd integral distances between points in the plane*, Discrete Comput. Geom. **16** (1996) 113–115.
doi:10.1007/BF02711135
- [8] M. Rosenfeld and N.L. Tiên, *Forbidden subgraphs of the odd-distance graph*, J. Graph Theory **75** (2014) 323–330.
doi:10.1002/jgt.21738
- [9] A. Soifer, *The Mathematical Coloring Book* (Springer-Verlag, New York, 2009).
doi:10.1007/978-0-387-74642-5
- [10] M. Tikhomirov, *On computational complexity of length embeddability of graphs*, Discrete Math. **339** (2016) 2605–2612.
doi:10.1016/j.disc.2016.05.011
- [11] D.B. West, *Introduction to Graph Theory* (Prentice Hall, 1996).
- [12] H. Weyl, *Über die Gibbs'sche Erscheinung und verwandte Konvergenzphänomene*, Rend. Circ. Mat. **30** (1910) 377–407.
doi:10.1007/BF03014883

Received 9 April 2018
Revised 6 August 2018
Accepted 6 August 2018