

CLOSED FORMULAE FOR THE STRONG METRIC DIMENSION OF LEXICOGRAPHIC PRODUCT GRAPHS

DOROTA KUZIĄK¹, ISMAEL G. YERO²

AND

JUAN A. RODRÍGUEZ-VELÁZQUEZ¹

¹*Departament d'Enginyeria Informàtica i Matemàtiques*
Universitat Rovira i Virgili
Av. Països Catalans 26, 43007 Tarragona, Spain

²*Departamento de Matemáticas, Universidad de Cádiz*
Av. Ramón Puyol s/n, 11202 Algeciras, Spain

e-mail: dorota.kuziak@urv.cat
ismael.gonzalez@uca.es
juanalberto.rodriguez@urv.cat

Abstract

Given a connected graph G , a vertex $w \in V(G)$ strongly resolves two vertices $u, v \in V(G)$ if there exists some shortest $u - w$ path containing v or some shortest $v - w$ path containing u . A set S of vertices is a strong metric generator for G if every pair of vertices of G is strongly resolved by some vertex of S . The smallest cardinality of a strong metric generator for G is called the strong metric dimension of G . In this paper we obtain several relationships between the strong metric dimension of the lexicographic product of graphs and the strong metric dimension of its factor graphs.

Keywords: strong metric dimension, strong metric basis, strong metric generator, lexicographic product graphs.

2010 Mathematics Subject Classification: 05C12, 05C69, 05C76.

REFERENCES

- [1] D. Geller and S. Stahl, *The chromatic number and other functions of the lexicographic product*, J. Combin. Theory Ser. B **19** (1975) 87–95.
doi:10.1016/0095-8956(75)90076-3
- [2] R. Hammack, W. Imrich and S. Klavžar, *Handbook of Product Graphs*, 2nd Ed. (CRC Press, Boca Raton, 2011).

- [3] F. Harary and R.A. Melter, *On the metric dimension of a graph*, Ars Combin. **2** (1976) 191–195.
- [4] J. Kratica, V. Kovačević-Vujčić, M. Čangalović and M. Stojanović, *Minimal doubly resolving sets and the strong metric dimension of some convex polytopes*, Appl. Math. Comput. **218** (2012) 9790–9801.
doi:10.1016/j.amc.2012.03.047
- [5] J. Kratica, V. Kovačević-Vujčić and M. Čangalović, *Computing strong metric dimension of some special classes of graphs by genetic algorithms*, Yugosl. J. Oper. Res. **18** (2008) 143–151.
doi:10.2298/YJOR0802143K
- [6] J. Kratica, V. Kovačević-Vujčić, M. Čangalović and N. Mladenović, *Strong metric dimension: A survey*, Yugosl. J. Oper. Res. **24** (2014) 187–198.
doi:10.2298/YJOR130520042K
- [7] D. Kuziak, I.G. Yero and J.A. Rodríguez-Velázquez, *On the strong metric dimension of corona product graphs and join graphs*, Discrete Appl. Math. **161** (2013) 1022–1027.
doi:10.1016/j.dam.2012.10.009
- [8] D. Kuziak, I.G. Yero and J.A. Rodríguez-Velázquez, *Strong metric dimension of rooted product graphs*, Int. J. Comput. Math. **93** (2016) 1265–1280.
doi:10.1080/00207160.2015.1061656
- [9] D. Kuziak, I.G. Yero and J.A. Rodríguez-Velázquez, *Erratum to “On the strong metric dimension of the strong products of graphs”*, Open Math. **13** (2015) 209–210.
doi:10.1515/math-2015-0020
- [10] D. Kuziak, I.G. Yero and J.A. Rodríguez-Velázquez, *On the strong metric dimension of the strong products of graphs*, Open Math. **13** (2015) 64–74.
doi:10.1515/math-2015-0007
- [11] T.R. May and O.R. Oellermann, *The strong dimension of distance-hereditary graphs*, J. Combin. Math. Combin. Comput. **76** (2011) 59–73.
- [12] N. Mladenović, J. Kratica, V. Kovačević-Vujčić and M. Čangalović, *Variable neighborhood search for the strong metric dimension problem*, Electron. Notes Discrete Math. **39** (2012) 51–57.
doi:10.1016/j.endm.2012.10.008
- [13] O.R. Oellermann and J. Peters-Fransen, *The strong metric dimension of graphs and digraphs*, Discrete Appl. Math. **155** (2007) 356–364.
doi:10.1016/j.dam.2006.06.009
- [14] J.A. Rodríguez-Velázquez, I.G. Yero, D. Kuziak and O.R. Oellermann, *On the strong metric dimension of Cartesian and direct products of graphs*, Discrete Math. **335** (2014) 8–19.
doi:10.1016/j.disc.2014.06.023
- [15] A. Sebó and E. Tannier, *On metric generators of graphs*, Math. Oper. Res. **29** (2004) 383–393.
doi:10.1287/moor.1030.0070

- [16] P.J. Slater, *Leaves of trees*, Congr. Numer. **14** (1975) 549–559.
- [17] E. Yi, *On strong metric dimension of graphs and their complements*, Acta Math. Sin. (Engl. Ser.) **29** (2013) 1479–1492.
doi:10.1007/s10114-013-2365-z

Received 1 August 2015
Revised 27 January 2016
Accepted 27 January 2016