

RAINBOW CONNECTIVITY OF CACTI AND OF SOME INFINITE DIGRAPHS

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Abstract

An arc-coloured digraph $D = (V, A)$ is said to be *rainbow connected* if for every pair $\{u, v\} \subseteq V$ there is a directed uv -path all whose arcs have different colours and a directed vu -path all whose arcs have different colours. The minimum number of colours required to make the digraph D rainbow connected is called the *rainbow connection number* of D , denoted $\vec{rc}(D)$. A cactus is a digraph where each arc belongs to exactly one directed cycle. In this paper we give sharp upper and lower bounds for the rainbow connection number of a cactus and characterize those cacti whose rainbow connection number is equal to any of those bounds. Also, we calculate the rainbow connection numbers of some infinite digraphs and graphs, and present, for each $n \geq 6$, a tournament of order n and rainbow connection number equal to 2.

Keywords: rainbow connectivity, cactus, arc-colouring.

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REFERENCES

- [1] J. Alva-Samos and J.J. Montellano-Ballesteros, *Rainbow connection in some digraphs*, Graphs Combin. **32** (2016) 2199–2209.
doi:10.1007/s00373-016-1723-x

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- [2] J. Bang-Jensen and G. Gutin, Digraphs: Theory, Algorithms and Applications (Springer-Verlag, 2002).
doi:10.1007/978-1-4471-3886-0
- [3] J.A. Bondy and U.S.R. Murty, Graph Theory (Springer-Verlag, 2008).
- [4] G. Chartrand, G.L. Johns, K.A. McKeon and P. Zhang, *Rainbow connection in graphs*, Math. Bohem. **133** (2008) 85–98.
- [5] P. Dorbec, I. Schiermeyer, E. Sidorowicz and E. Sopena, *Rainbow connection in oriented graphs*, Discrete Appl. Math. **179** (2014) 69–78.
doi:10.1016/j.dam.2014.07.018
- [6] R. Holliday, C. Magnant and P.S. Nowbandegani, *Note on rainbow connection in oriented graphs with diameter 2*, Theory Appl. Graphs **1** (2014).

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