MAXIMUM INDEPENDENT SETS IN DIRECT PRODUCTS OF CYCLES OR TREES WITH ARBITRARY GRAPHS

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Abstract

The direct product of graphs $G = (V(G), E(G))$ and $H = (V(H), E(H))$ is the graph, denoted as $G \times H$, with vertex set $V(G \times H) = V(G) \times V(H)$, where vertices $(x_1, y_1)$ and $(x_2, y_2)$ are adjacent in $G \times H$ if $x_1x_2 \in E(G)$ and $y_1y_2 \in E(H)$. Let $n$ be odd and $m$ even. We prove that every maximum independent set in $P_n \times G$, respectively $C_m \times G$, is of the form $(A \times C) \cup (B \times D)$, where $C$ and $D$ are nonadjacent in $G$, and $A \cup B$ is the bipartition of $P_n$ respectively $C_m$. We also give a characterization of maximum independent subsets of $P_n \times G$ for every even $n$ and discuss the structure of maximum independent sets in $T \times G$ where $T$ is a tree.

Keywords: direct product, independent set.

2010 Mathematics Subject Classification: 05C69, 05C38.

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doi:10.7151/dmgt.1527

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doi:10.1016/j.disc.2012.09.008


doi:10.1002/jgt.20526


doi:10.1016/j.ejc.2011.03.004

Received 26 June 2014
Revised 8 February 2015
Accepted 17 February 2015