ARS MATHEMATICA CONTEMPORANEA

Also available at http://amc-journal.eu
ISSN 1855-3966 (printed edn.), ISSN 1855-3974 (electronic edn.)
ARS MATHEMATICA CONTEMPORANEA 7 (2014) 293–297

On the connectivity of Cartesian product of graphs

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Abstract

We give a new alternative proof of Liouville's formula which states that for any graphs G and H on at least two vertices, $\kappa(G \Box H) = \min\{\kappa(G)|H|, |G|\kappa(H), \delta(G) + \delta(H)\}$, where κ and δ denote the connectivity number and minimum degree of a given graph, respectively. The main idea of our proof is based on construction of a vertex-fan which connects a vertex from $V(G \Box H)$ to a subgraph of $G \Box H$. We also discuss the edge version of this problem as well as formula for products with more than two factors.

Keywords

connectivity, Cartesian product

Math. Subj. Class.: 05C40, 05C76

O povezanosti kartezičnega produkta grafov

Povzetek

V članku predstavimo nov, alternativen, dokaz Liouvillove formule, ki pravi, da za poljubna grafa G in H z najmanj dvema vozliščema, velja $\kappa(G \Box H) = \min\{\kappa(G)|H|, |G|\kappa(H), \delta(G) + \delta(H)\}$, kjer κ in δ označujeta povezavno število in minimalno stopnjo danega grafa. Glavna ideja najinega dokaza je zasnovana na konstrukciji pahljače vozlišč, ki povezuje vozlišče iz $V(G \Box H)$ s podgrafom grafa $G \Box H$. Obravnavamo tudi povezavno različico tega problema, pa tudi formulo za produkte z več kot dvema faktorjema.

Ključne besede

Povezanost, kartezični produkt