ARS MATHEMATICA CONTEMPORANEA

Also available at http://amc-journal.eu
ISSN 1855-3966 (printed edn.), ISSN 1855-3974 (electronic edn.)
Ars Mathematica Contemporanea Volume 7, Issue 1, Year 2014, Pages 123-140

Convex cycle bases

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Abstract

Convex cycles play a role e.g. in the context of product graphs. We introduce convex cycle bases and describe a polynomial-time algorithm that recognizes whether a given graph has a convex cycle basis and provides an explicit construction in the positive case. Relations between convex cycles bases and other types of cycles bases are discussed. In particular we show that if G has a unique minimal cycle bases, this basis is convex. Furthermore, we characterize a class of graphs with convex cycles bases that includes partial cubes and hence median graphs.

Keywords

cycle basis; convex subgraph; isometric subgraph; Cartesian product; partial cubes

Math. Subj. Class.: 05C15 05C10 05C38

Baze konveksnih ciklov

Povzetek

Konveksni cikli igrajo pomembno vlogo npr. v kontekstu produktnih grafov. V članku vpeljemo baze konveksnih ciklov in opišemo algoritem, ki v polinomskem času ugotovi, ali ima dani graf bazo konveksnih ciklov in jo v primeru, da je tako, tudi eksplicitno konstruira. Obravnavamo tudi relacije med bazami konveksnih ciklov in drugimi tipi baz ciklov. Posebej pokažemo tudi, da če ima G eno samo minimalno bazo ciklov, potem je ta baza konveksna. Poleg tega karakteriziramo razred grafov z bazami konveksnih ciklov, ki vključuje parcialne kocke in posledično medianske grafe.

Ključne besede

Baza ciklov; konveksen podgraf; izometričen podgraf; kartezični produkt; parcialne kocke