

Continuous forcing spectra of perfect matchings of convex hexagonal systems*

Bo Zhang, Yaxian Zhang , Heping Zhang [†] 

*School of Mathematics and Statistics, Lanzhou University,
Lanzhou, Gansu 730000, P.R. China*

Received 7 August 2022, accepted 3 May 2023, published online 18 September 2025

Abstract

A convex hexagonal system is a hexagonal system whose inner dual graph has a convex polygonal boundary. A forcing set S for a perfect matching M of a graph G is a subset of M that is contained in no other perfect matchings of G . The smallest cardinality of a forcing set of M is called the forcing number of M , denoted by $f(G, M)$. The forcing spectrum of G is defined as: $\text{Spec}(G) = \{f(G, M) | M \text{ is a perfect matching of } G\}$. In this paper, we show that for any convex hexagonal system $O(m, k, n)$ with a perfect matching, its forcing spectrum is continuous (or an integer interval).

Keywords: Convex hexagonal system, perfect matching, forcing number, forcing spectrum.

Math. Subj. Class. (2020): 05C70, 05C92, 92E10

*This work is supported by NSFC (Grant No. 12271229). The authors are very grateful to the referees for their valuable suggestions and comments in improving the presentation of this manuscript.

[†]Corresponding author.

E-mail addresses: 1879190934@qq.com (Bo Zhang), zhangyax@lzu.edu.cn (Yaxian Zhang), zhanghp@lzu.edu.cn (Heping Zhang)

Zvezni prisilni spektri popolnih prirejanj v konveksnih heksagonalnih sistemih*

Bo Zhang, Yaxian Zhang , Heping Zhang [†] 

*School of Mathematics and Statistics, Lanzhou University,
Lanzhou, Gansu 730000, P.R. China*

Prejeto 7. avgusta 2022, sprejeto 3. maja 2023, objavljeno na spletu 18. septembra 2025

Povzetek

Konveksen heksagonalni sistem je heksagonalni sistem, katerega notranji dualni graf ima konveksen poligonalni rob. Prisilna množica S popolnega prirejanja M grafa G je podmnožica množice M , ki ni vsebovana v nobenem drugem popolnem prirejanju grafa G . Najmanjša kardinalnost prisilne množice prirejanja M se imenuje prisilno število prirejanja M , označimo pa ga s $f(G, M)$. Prisilni spekter grafa G je definiran kot: $\text{Spec}(G) = \{f(G, M) | M \text{ je popolno prirejanje grafa } G\}$. V tem članku pokažemo, da je za vsak konveksen heksagonalni sistem $O(m, k, n)$ s popolnim prirejanjem njegov prisilni spekter zvezen (je celoštevilski interval).

Ključne besede: Konveksen heksagonalni sistem, popolno prirejanje, prisilno število, prisilni spekter.
Math. Subj. Class. (2020): 05C70, 05C92, 92E10

*To delo je podprto s strani NSFC (dotacija št. 12271229). Avtorji so zelo hvaležni recenzentom za njihove dragocene predloge in pripombe pri izboljšavi predstavitve tega rokopisa.

[†]Korespondenčni avtor.

E-poštni naslovi: 1879190934@qq.com (Bo Zhang), zhangyx@lzu.edu.cn (Yaxian Zhang), zhanghp@lzu.edu.cn (Heping Zhang)