

An extension of the Erdős-Ko-Rado theorem to uniform set partitions

Karen Meagher* , Mahsa N. Shirazi 

*Department of Mathematics and Statistics, University of Regina,
Regina, SK, S4S 0A2, Canada*

Brett Stevens† 

*School of Mathematics and Statistics, Carleton University,
Ottawa, ON, K1S 5B6, Canada*

Received 14 September 2019, accepted 25 December 22, published online 27 February 2023

Abstract

A (k, ℓ) -partition is a set partition which has ℓ blocks each of size k . Two (k, ℓ) -partitions P and Q are said to be *partially t -intersecting* if there exist blocks P_i in P and Q_j in Q such that $|P_i \cap Q_j| \geq t$. In this paper we prove a version of the Erdős-Ko-Rado theorem for partially 2-intersecting (k, ℓ) -partitions. In particular, we show for ℓ sufficiently large, the set of all (k, ℓ) -partitions in which a block contains a fixed pair is the largest set of 2-partially intersecting (k, ℓ) -partitions. For $k = 3$, we show this result holds for all ℓ .

Keywords: Erdős-Ko-Rado Theorem, uniform set partitions, ratio bound, clique, coclique, quotient graphs.

Math. Subj. Class. (2020): 05E30, 05C50, 05C25

*Corresponding author. Research supported by NSERC Discovery Research Grant, Application No.: RGPIN-2018-03952.

†Research supported by NSERC Discovery Research Grant, Application No.: RGPIN-2017-06392.

E-mail addresses: karen.meagher@uregina.ca (Karen Meagher), mahsa.nasrollahi@gmail.com (Mahsa N. Shirazi), brett@math.carleton.ca (Brett Stevens)

Razširitev Erdős-Ko-Radovega izreka na uniformne particije množic

Karen Meagher * , Mahsa N. Shirazi 

*Department of Mathematics and Statistics, University of Regina,
Regina, SK, S4S 0A2, Canada*

Brett Stevens † 

*School of Mathematics and Statistics, Carleton University,
Ottawa, ON, K1S 5B6, Canada*

Prejeto 14. septembra 2019, sprejeto 25. decembra 2022, objavljeno na spletu 27. februarja 2023

Povzetek

(k, ℓ) -particija je particija množice, ki ima ℓ blokov, vsak od njih pa ima velikost k . Dve (k, ℓ) -particiji P in Q se imenujeta *delno t -sekajoči se*, če obstajata bloka P_i v P in Q_j v Q , za katera velja $|P_i \cap Q_j| \geq t$. V tem članku dokažemo različico Erdős-Ko-Radovega izreka za delno 2-sekajoče se (k, ℓ) -particije. Posebej pokažemo, da je za dovolj velik ℓ množica vseh (k, ℓ) -particij, v katerih nek blok vsebuje fiksni par, največja množica 2-delno sekajočih se (k, ℓ) -particij. Za $k = 3$ pokažemo, da ta rezultat velja za vse ℓ .

Ključne besede: Erdős-Ko-Radov izrek, enakomerna particija množic, meja razmerja, klika, koklika, kvocientni grafi.

Math. Subj. Class. (2020): 05E30, 05C50, 05C25

* Kontaktni avtor. Raziskava podprta s strani NSERC Discovery Research Grant, št.: RGPIN-2018-03952.

† Raziskava podprta s strani NSERC Discovery Research Grant, št.: RGPIN-2017-06392.

E-poštni naslovi: karen.meagher@uregina.ca (Karen Meagher), mahsa.nasrollahi@gmail.com (Mahsa N. Shirazi), brett@math.carleton.ca (Brett Stevens)