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Coloring properties of categorical product of general Kneser hypergraphs*

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Abstract: More than 50 years ago Hedetniemi conjectured that the chromatic number of categorical product of two graphs is equal to the minimum of their chromatic numbers. This conjecture has received a considerable attention in recent years. Hedetniemi's conjecture was generalized to hypergraphs by Zhu in 1992. Hajiabolhassan and Meunier, in 2016, introduced the first nontrivial lower bound for the chromatic number of categorical product of general Kneser hypergraphs and using this lower bound, they verified Zhu's conjecture for some families of hypergraphs. In this paper, we shall present some colorful type results for the coloring of categorical product of general Kneser hypergraphs, which generalize the Hajiabolhassan-Meunier result. Also, we present a new lower bound for the chromatic number of categorical product of general Kneser hypergraphs which can be much better than the Hajiabolhassan-Meunier lower bound. Using this lower bound, we enrich the family of hypergraphs satisfying Zhu's conjecture.

Keywords: Categorical product, chromatic number, Hedetniemi's conjecture, general Kneser hypergraph.

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Barvitost kategoričnega produkta splošnih Kneserjevih hipergrafov*

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Povzetek: Pred več kot 50 leti je Hedetniemi postavil domnevo, da je barvitost (kromatično število) kategoričnega produkta dveh grafov enako minimumu njunih barvitosti. Ta domneva je bila v zadnjih letih deležna precejšnje pozornosti. Hedetniemijevo domnevo je leta 1992 Zhu posplošil na hipergrafe. Hajiabolhassan in Meunier sta leta 2016 predstavila prvo netrivialno spodnjo mejo za barvitost kategoričnega produkta splošnih Kneserjevih hipergrafov in z uporabo te spodnje meje sta potrdila resničnost Zhujeve domneve za nekaj družin hipergrafov. V tem članku predstavimo nekaj rezultatov o barvitosti kategoričnega produkta splošnih Kneserjevih hipergrafov, ki so posplošitev rezultata Hajiabolhassana in Meunierja. Prav tako predstavimo novo spodnjo mejo za barvitost kategoričnega produkta splošnih Kneserjevih hipergrafov, ki je lahko mnogo boljša od spodnje meje Hajiabolhassana in Meunierja. Z uporabo te spodnje meje obogatimo družino hipergrafov, ki zadoščajo Zhujevi domnevi.

Ključne besede: Kategorični produkt, barvitost (kromatično število), Hedetniemijeva domneva, splošni Kneserjev hipergraf.

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