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Horadam cubes

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Abstract

We define and investigate a new three-parameter family of graphs that further generalizes the Fibonacci and metallic cubes. Namely, the number of vertices in this family of graphs satisfies Horadam recurrence, a linear recurrence of second order with constant coefficients. It is shown that the new family preserves many appealing and useful properties of the Fibonacci and metallic cubes. In particular, we present recursive decomposition and decomposition into grids. Furthermore, we explore metric and enumerative properties such as the number of edges, distribution of degrees, and cube polynomials. We also investigate the existence of Hamiltonian paths and cycles.

Keywords: Hypercube, Fibonacci cube, metallic cube, Horadam's recurrence.

Math. Subj. Class. (2020): 05C75, 05C30, 05C07

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Horadamove kocke

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Povzetek

Definiramo in raziskujemo novo trirazsežno družino grafov, ki dodatno posplošuje Fibonaccijeve in kovinske kocke. Število vozlišč v tej družini grafov sledi Horadamovi rekurziji, to je linearni rekurzivni zvezi drugega reda s konstantnimi koeficienti. Pokažemo, da nova družina ohranja številne privlačne in uporabne lastnosti Fibonaccijevih in kovinskih kock. Zlasti predstavimo rekurzivno dekompozicijo in dekompozicijo v mreže. Nadalje raziskujemo metrične in enumerativne lastnosti, kot so število povezav, porazdelitev stopenj in polinomi kock. Prav tako preučimo obstoj Hamiltonovih poti in ciklov.

Ključne besede: hiperkoca, Fibonaccijeva kocka, kovinska kocka, Horadamova rekurzija.

Math. Subj. Class. (2020): 05C75, 05C30, 05C07

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