

Also available at <http://amc-journal.eu>
ISSN 1855-3966 (printed edn.), ISSN 1855-3974 (electronic edn.)
Ars Mathematica Contemporanea Volume 3, Issue 1, Year 2010, Pages 13-19

Eigenspaces of Hamming graphs and unitary Cayley graphs

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Abstract

In this work, the eigenspaces of unitary Cayley graphs and certain Hamming graphs are considered. It is shown that these graph classes are closely related and admit particularly simple eigenspace bases for all eigenvalues, namely bases containing vectors only with entries from the set $\{0, 1, -1\}$. A direct consequence is that the considered graph classes are integral.

Keywords: Eigenvalue, eigenspace, Hamming graph, Cayley graph.

Math. Subj. Class.: 05C50, 15A18

Math Sci Net: [05C50 \(05C25 05C76 15A18\)](#)

Lastni prostori Hammingovih grafov in unitarnih Cayleyevih grafov

Povzetek

V članku obravnavamo lastne podprostore unitarnih Cayleyevih grafov in nekaterih Hammingovih grafov. Pokažemo, da so ti razredi grafov tesno povezani in imajo posebej enostavno bazo lastnega podprostora za vse lastne vrednosti, baza namreč vsebuje samo vektorje s komponentami iz množice $\{0, 1, -1\}$. Od tod neposredno sledi, da so obravnavani grafi integralni.

Ključne besede: Lastna vrednost, lastni prostor, Hammingov graf, Cayleyev graf.