



Also available at <http://amc-journal.eu>
ISSN 1855-3966 (printed edn.), ISSN 1855-3974 (electronic edn.)
ARS MATHEMATICA CONTEMPORANEA 7 (2014) 453–459

Commuting graphs and extremal centralizers

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Abstract

We determine the conditions for matrix centralizers which can guarantee the connectedness of the commuting graph for the full matrix algebra $M_n(\mathbf{F})$ over an arbitrary field \mathbf{F} . It is known that if \mathbf{F} is an algebraically closed field and $n \geq 3$, then the diameter of the commuting graph of $M_n(\mathbf{F})$ is always equal to four. We construct a concrete example showing that if \mathbf{F} is not algebraically closed, then the commuting graph of $M_n(\mathbf{F})$ can be connected with the diameter at least five.

Keywords

Commuting graph, matrix ring, centralizer.

Math. Subj. Class.: 05C40, 15A27, 15A04

Komutirajoči grafi in ekstremni centralizatorji

Povzetek

V članku določimo pogoje za matrične centralizatorje, ki zagotavljajo povezanost komutirajočega grafa polne matrične algebre $M_n(\mathbf{F})$ nad poljubnim poljem \mathbf{F} . Znano je, da če je \mathbf{F} algebraično zaprto polje in je $n \geq 3$, potem je premer komutirajočega grafa $M_n(\mathbf{F})$ vedno enak štiri. Konstruiramo tudi konkreten primer, ki pokaže, da če \mathbf{F} ni algebraično zaprt, potem je komutirajoči graf algebre $M_n(\mathbf{F})$ lahko povezan in ima premer najmanj pet.

Ključne besede

Komutirajoči graf, matrični kolobar, centralizator.