

Parallelism of stable traces

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Abstract

A parallel d -stable trace is a closed walk which traverses every edge of a graph exactly twice in the same direction and for every vertex v , there is no subset $X \subseteq N(v)$ with $1 \leq |X| \leq d$ such that every time the walk enters v from X , it also exits to a vertex in X . In the past, d -stable traces were investigated as a mathematical model for an innovative biotechnological procedure – self-assembling of polypeptide structures. Among other, it was proven that graphs that admit parallel d -stable traces are precisely Eulerian graphs with minimum degree strictly larger than d . In the present paper we give an alternative, purely combinatorial proof of this result.

Keywords: Eulerian graph, parallel d -stable trace, nanostructure design, self-assembling, polypeptide.

Math. Subj. Class.: 05C45, 05C85, 94C15

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Paralelnost stabilnih obhodov

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Povzetek

Paralelni d -stabilni obhod je sklenjen sprehod, ki vsako povezava grafa prečka natanko dvakrat v isti smeri, pri tem pa za vsako vozlišče v velja, da ne obstaja taka podmnožica njegovih sosedov $X \subseteq N(v)$, $1 \leq |X| \leq d$, da vsakič, ko sprehod pride v v iz vozlišča $v \in X$, tudi zapusti v v smeri proti vozlišču $v \in X$. V preteklosti so bili d -stabilni obhodi, kot matematični model za nove in inovativne biotehnoške raziskave, že raziskani. Med drugim so bili grafi, ki vsebujejo paralelne d -stabilne obhode karakterizirani kot Eulerjevi grafi z minimalno stopnjo $\delta > d$. V pričujočem članku je podan alternativni (kombinatorični) dokaz tega rezultata.

Ključne besede: Eulerjev graf, paralelni d -stabilni obhodi, oblikovanje nanostruktur, samosestavljivost, polipeptidi.

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