

NEW DOCTORAL DEGREES

IN THE DEPARTMENT OF MATHEMATICS
UNIVERSITY OF OSIJEK

Dr. Snježana Majstorović received her PhD in Mathematics from the Department of Mathematics of the University of Zagreb on 04 July 2011 with the dissertation entitled “DOMINATION NUMBERS OF SIMPLE POLYGONAL CHAINS AND MULTIPLE LINEAR HEXAGONAL CHAINS” (Mentors: Prof. A. Klobučar and Prof. T. Došlić).

Abstract

Domination is an area in graph theory with an extensive research activity, together with its numerous generalizations and modifications, motivated by various applications and problems. The most interesting part of this area is the multitude of types of domination.

In general, a dominating set of a graph is a set D such that every vertex of a graph is either in D or is adjacent to some vertex in D . Domination number is the cardinality of the smallest dominating set D .

The problem to determine the domination number of graph is NP – *hard* even when restricted to some simple graph structures. However, there are certain graph structures for which domination numbers can be determined by using some well-known mathematical tools like mathematical induction or partition of graph into small parts, mutually isomorphic subgraphs, for which domination number can be easily established.

This thesis is focused on distance k -domination and total domination on two types of graphs: simple polygonal chains (with cactus chains included) and multiple linear hexagonal chains. After determination of domination numbers of equidistant cactus chains, extremal chains regarding this graph invariant are found. Some results about edge domination are presented for hexagonal cactus chains and then compared to (vertex) domination. Some results were presented about domination ratio. For simple polygonal chains considered types of domination are also investigated. At last, the domination numbers of multiple linear hexagonal chains were determined.

The most important part of the thesis is proof that considered dominating set has minimum cardinality among all dominating sets of considered graph. Usual procedure is to either establish that dominating set is perfect, or try to find some obvious property that every (and therefore the minimum) dominating set satisfies or do the partition of graph into smaller parts, called blocks, on which the domination number can be easily established.

Published papers

- [1] I. Gutman, A. Klobučar, **S. Majstorović**, C. Adiga, *Biregular Graphs Whose Energy Exceeds the Number of Vertices*, MATCH : communications in mathematical and in computer chemistry **62**(2009), No. 3, 499–508.
- [2] **S. Majstorović**, A. Klobučar, I. Gutman, *Triregular Graphs Whose Energy Exceeds the Number of Vertices*, MATCH : communications in mathematical and in computer chemistry **62**(2009) No. 3, 509–524.

- [3] **S. Majstorović**, A. Klobučar, I. Gutman, *Tricyclic Biregular Graphs whose Energy Exceeds the Number of Vertices*, *Mathematical Communications* **15**(2010), No. 1, 213–222.
- [4] **S. Majstorović**, A. Klobučar, I. Gutman, *Selected topics from the theory of graph energy: hypoenergetic graphs*, *Applications of graph spectra*, D. Cvetković, I. Gutman (ur.). Beograd, Matematički institut SANU, 2009, 65–105.
- [5] **S. Majstorović**, A. Klobučar, *Upper bound for total domination number on linear and double hexagonal chains*, *International Journal of Chemical Modeling* **3**(2010), 139–145.
- [6] **S. Majstorović**, *K-domination sets on double linear hexagonal chains*, *Aplimat-Journal of Applied Mathematics* **3**(2010) 3, 77–86.
- [7] **S. Majstorović**, A. Klobučar, T. Došlić, *Domination numbers of m -cactus chains*, *Ars Combinatoria*, accepted for publication.