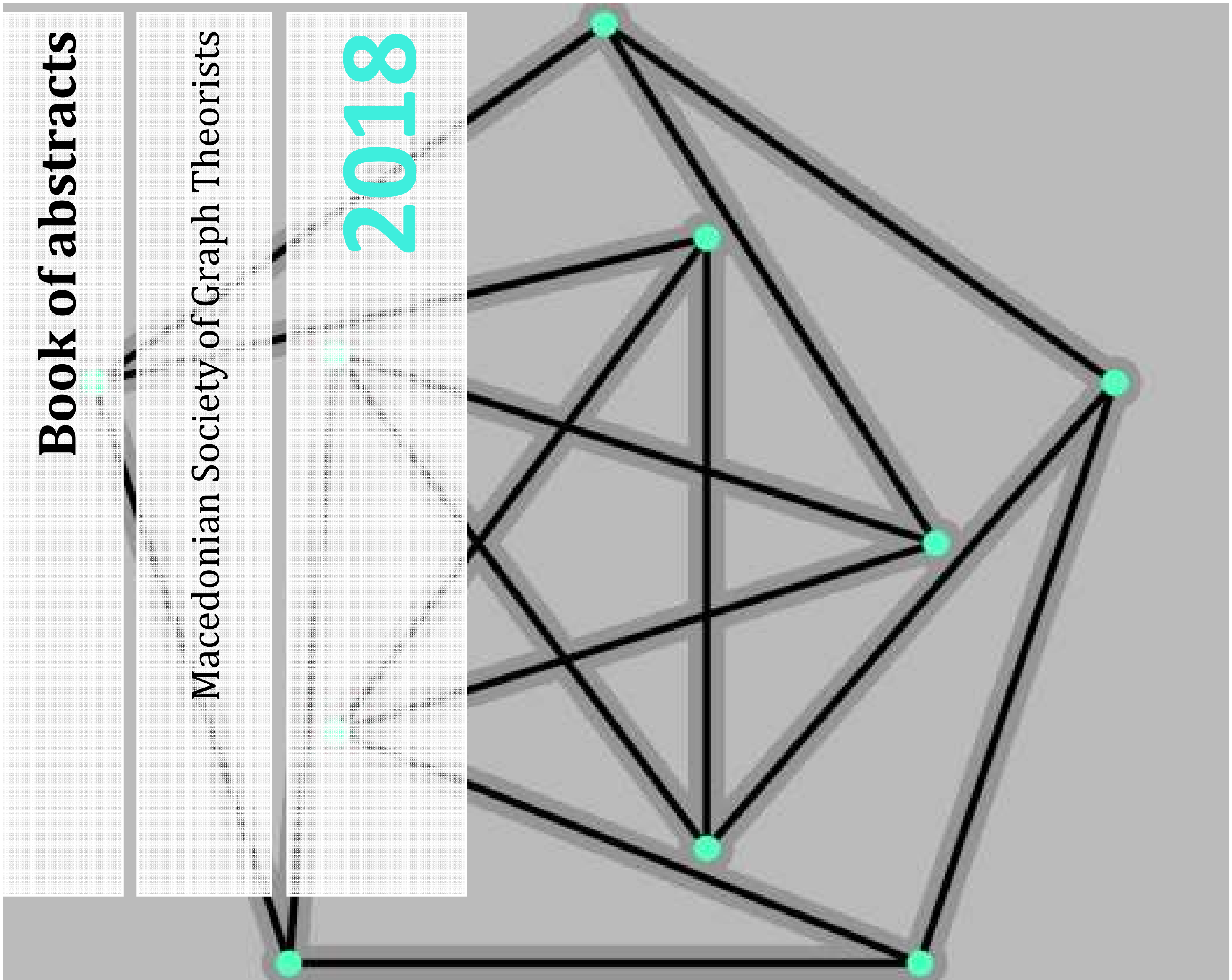
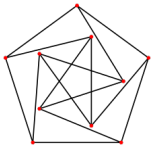
Book of abstracts

Macedonian Society of Graph Theorists

2018



Macedonian Workshop on Graph Theory and Applications



Macedonian Society
of Graph Theorists

3rd Macedonian Workshop on Graph Theory
and Applications

Ohrid, August 13–17, 2018

Book of Abstracts

Editor:
Vesna Andova

Publisher:
Macedonian Society of
Graph Theorists

Scientific committee :
Vesna Andova
Mirko Petruševski
Riste Škrekovski

Local organizing committee :
Vesna Andova
Mirko Petruševski
Riste Škrekovski

Technical support :
Vesna Andova
Pavel Dimovski
Bojan Prangoski

Sponsor :
Macedonian Society of Graph Theorists

Contents

Invited talk

A Word on the Quality of Topological Molecular Descriptors

Boris Furtula

Faculty of Science, University of Kragujevac, Serbia
furtula@kg.ac.rs

Abstract

A molecular descriptor is an inescapable ingredient in QSPR/QSAR researches. There is a legion of so-called molecular descriptors. However, a majority of them have never been used in any chemically sound investigation, but they are just a product of mathematical joggling. This talk is aiming to present a chemist's view on molecular descriptors. A couple of topics will be covered here:

- A definition of a molecular descriptor;
- classification of molecular descriptors;
- a history of molecular descriptors;
- a recipe for developing a topological "molecular" descriptor;
- qualities of a proper molecular descriptor.

The focus of this talk will be on the qualities of molecular descriptors and the ways in which they could be quantified. These will be illustrated on *symmetric division deg index*. Quantified properties of topological molecular descriptors are suitable for ranking and filtering existing ones, but also, they could be used as a condition that must be met when introducing the new topological indices.

Contributed talks

Vertex geometry on hexagonal lattice and nanotubes

Vesna Andova

Faculty of Electrical Engineering and Information Technologies,
Ss Cyril and Methodius Univ.,
Ruger Boskovik 18, 1000 Skopje, Macedonia
vesna.andova@gmail.com

Abstract

Nanotubes are graphs obtained by wrapping a hexagonal grid, and then possibly closing the tube with patches. Here we assign a coordinate to each vertex on a hexagonal grid, and respectively on a tube. This approach might be very useful when dealing with distances on a hexagonal tube as well as on benzenoid systems.

(Join work with Pavel Dimovski and Riste Škrekovski)

Some results on unique-maximum coloring of plane graphs

Riste Škrekovski

Faculty of Information Studies, Novo mesto
& Faculty of Mathematics and Physics, University of Ljubljana, Slovenia.
skrekovski@gmail.com

Abstract

A *unique-maximum* coloring of a plane graph is a proper vertex coloring by natural numbers where on each face α the maximal color appears exactly once on the vertices of α. Fabrici and Göring proved that six colors are enough for any plane graph and conjectured that four colors suffice. Thus, this conjecture is a strengthening of the Four Color Theorem. Wendland later decreased the upper bound from six to five.

We first show that the conjecture holds for various subclasses of planar graphs but then we disprove it for planar graphs in general. So, we conclude that the facial unique-maximum chromatic number of the sphere is not four but five.

Additionally, we will consider a facial edge-coloring analogue of the aforementioned coloring.

(Joint work with Vesna Andova, Bernard Lidický, Borut Lužar, and Kacy Messerschmidt)

Relaxed version of Šoltes's problem

Snježana Majstorović

University of Osjek, Croatia
smajstor@mathos.hr

Abstract

The *total distance* or *Wiener index* $W(G)$ of a connected graph G is defined as the sum of distances between all (unordered) pairs of vertices in G. In 1991, Šoltés posed the following problem:

Find all such graphs G that the equality $W(G) = W(G - v)$ holds for all their vertices v.

Untill now, only one such graph is known: it is a cycle with 11 vertices. Motivated by Šoltés's problem we construct an infinite family of unicyclic graphs which preserve total distance after removal of a particular vertex.
We prove that there are infinitely many unicyclic graphs with this property even when we fix the length of the cycle.
We show that for every graph G there are infinitely many graphs H such that G is an induced subgraph of H and $W(H) = W(H - v)$ for some vertex $v \in V(H) \setminus V(G)$.
For $k \geq 3$ we show that there are infinitely many graphs G with a vertex v of degree k for which $W(G) = W(G - v)$.
We prove the existence of such graphs when the degree is $n - 1$ or $n - 2$.
Finally, we show that dense graphs cannot be a solution of Šoltes's problem.

Our contribution shows that the class of graphs, which total distance does not change when a particular vertex is removed, is rich. This gives hope that Šoltes's problem may have another solution beside C_{11}.

Steiner triple systems with small circumference

Justin Z. Schroeder

USA & Macedonia
jzschroeder@gmail.com

Abstract

Let $S = (V, B)$ be a Steiner triple system on n points. For any distinct points $a, b \in V$, let $G_{a,b}$ be the graph on vertex set $V \backslash \{a, b, c\}$, where $abc \in \mathfrak{B}$, such that xy is an edge in $G_{a,b}$ if and only if $axy \in \mathfrak{B}$ or $bxy \in \mathfrak{B}$. $G_{a,b}$ is called a cycle graph and consists of a disjoint union of even cycles. We define the circumference of S, denoted $c(S)$, to be the length of the longest cycle contained in any cycle graph $G_{a,b}$, and we define $c(n)$ to be the minimum value of $c(S)$ taken over all Steiner triple systems S of order n. In this talk, we present some constructions for $STS(n)$ with small circumference, discuss what is known about $c(n)$ for $n < 100$, and apply these results to a graph coloring problem of Häggkvist.

On vertex-parity edge-colorings

Mirko Petruševski

Faculty of Mechanical Engineering,
Ss. Cyril and Methodius Univ., Macedonia
mirko.petrushevski@gmail.com

Abstract

A vertex signature π of a finite graph G is any mapping $\pi : V(G) \to \{0,1\}$. An edge-coloring of G is said to be *vertex-parity* for the pair (G,π) if for every vertex v each color used on the edges incident to v appears in parity accordance with π, i.e. an even or odd number of times depending on whether $\pi(v)$ equals 0 or 1, respectively. The minimum number of colors for which (G,π) admits such an edge-coloring is denoted by $\chi'_p(G,\pi)$. We present necessary and sufficient conditions for existence of χ'_p and discuss the possible values of this graph parameter. We also mention a recent application of vertex-parity edge-colorings.

(Joint work with B. Lužar and R. Škrekovski.)

List of participants

1. Furtula Boris - invited speeker
   Faculty of Science, University of Kragujevac,
   P. O. Box 60, 34000 Kragujevac, Serbia
   furtula@kg.ac.rs

2. Andova Vesna
   Faculty of Electrical Engineering and Information Technologies,
   Ss Cyril and Methodius Univ.,
   Ruger Boskovik 18, 1000 Skopje, Macedonia
   vesna.andova@gmail.com

3. Dimovski Pavel
   Faculty of Technology and Metalurgy,
   Ss Cyril and Methodius Univ.,
   Ruger Boskovik 16, 1000 Skopje, Macedonia
   dimovski.pavel@gmail.com

4. Majstorović Snježana
   University of Osjek, Osjek, Croatia,
   smajstor@mathos.hr

5. Petruševski Mirko
   Faculty of Mechanical Engeineering,
   Ss Cyril and Methodius Univ.,
   Ruger Boskovik 18, 1000 Skopje, Macedonia
   mirko.petrushevski@gmail.com

6. Prangoski Bojan
Faculty of Mechanical Engeineering,
Ss Cyril and Methodius Univ.,
Ruger Boskovik 18, 1000 Skopje, Macedonia
bprangoski@yahoo.com

7. Schroeder Justin Z.
USA & Macedonia
jzschroeder@gmail.com

8. Škrekovski Riste
Faculty of Information Studies, Novo mesto
& Faculty of Mathematics and Physics, University of Ljubljana, Slovenia
skrekovski@gmail.com

Notes

Macedonian Workshop on Graph Theory and Applications

PROGRAMME

	Monday 13.08.2017	**Tuesday** 14.08.2017	**Wednesday** 15.08.2017	**Thursday** 16.08.2017	**Friday** 17.08.2017
8:00-10:00		Breakfast	Breakfast	Breakfast	Breakfast
10:15-11:00	Arriving in Ohrid	*Vertex geometry on hexagonal lattice and nanotube* V. Andova		Relaxed version of Šoltes's problem , S. Majstorović	
11:00-11:45		*Some results on unique-maximum coloring of plane graphs* R.Škrekovski		Steiner triple systems with small circumference J. Schroeder	
12:00-14:00	Lunch	Lunch	Excursion to St Naum monastery	Lunch	
14:30-15:00	*Opening talk* *R. Škrekovski*				
15:00-15:45	Prof. Boris Furtula Invited talk	*Problem session*		On Vertex-parity Edge-colorings M.Petruševski	
16:00-16:45					
19:00-21:00	Diner	Diner	Diner	Diner	