JOHN SINKOVIC

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Academic Positions

Postdoctoral Fellow, Department of Combinatorics and Optimization,
University of Waterloo, 2015–Current
Algebraic Graph Theory Group
Mentor: Chris Godsil

Visiting Assistant Professor, Department of Math and Statistics,
Georgia State University, 2013–2015

Education

PhD Mathematics, Brigham Young University, 2009–2013
advisor: Wayne Barrett

PhD Student, Technische Universiteit Eindhoven , The Netherlands, 2007–2009
advisor: Hein van der Holst

Research Interests

combinatorial matrix theory, algebraic graph theory, spectral graph theory, quantum walks on graphs, inertia bounds for graphs

Teaching Experience

Postdoctoral Fellow, University of Waterloo, August 2015–Current

Honors Linear Algebra 1, Fall 2016

Visiting Assistant Professor, Georgia State University, Aug 2013–July 2015

Survey of Calculus, Spring 2015
Calculus of One Variable I, Spring 2015
Calculus of One Variable II, Fall 2014, Summer 2015
*Geometry and Spatial Sense**, Summer 2014, Summer 2015
*Intermediate Algebra***, Summer 2014
*Introduction to Statistical Methods***, Spring 2014
*Introduction to Mathematical Modeling***, Fall 2013, Spring 2014, Fall 2014
*Foundations of Mathematics**, Fall 2013

* These courses were composed of graduate and undergraduate students majoring in education.
** These courses were supplemented with online homework using MyMathLab/MyStatLab.

Graduate Instructor, Brigham Young University, Sept 2009–Aug 2013

Responsibilities included preparing and presenting lectures, writing and grading exams, and determining course schedule and pace.

*Linear Algebra***, Winter 2013, Summer 2013

Calculus of Several Variables, Summer 2012
Calculus II, Summer 2011
*Trigonometry***, Spring 2010

Graduate Teaching Assistant, Brigham Young University, Sept 2009–Aug 2013

Responsibilities included directing hour long recitation twice a week per section, holding 2-3 office hours per week, writing rubrics for homework, assisting in writing and grading exams, and answering emails from students with questions concerning online homework (WebWork).

Calculus I and II during Fall and Winter Semesters of 2010-2012.

Graduate Teaching Assistant, TU Eindhoven, Aug 2007 - May 2009

In Preparation

i. ***A note on minimum rank and outerplanar graphs***

ii. ***Separating tree-depth criticality and 1-uniqueness***
with Michael Barrus.

Submitted Publications

I. ***A graph for the which the inertia bound is not tight***,
Submitted to *Journal of Algebraic Combinatorics*, eprint arXiv:1609.02826.

Publications

13. ***On the principal permanent rank characteristic sequences of graphs and digraphs***,
with Keivan Monfared, Paul Horn, Franklin Kenter, Kathleen Nowak, and Josh Tobin,
Electronic Journal of Linear Algebra, 31: 187–199, 2016.

12. ***Uniqueness and minimal obstructions for tree-depth***,
with Michael Barrus,
Discrete Mathematics, 339: 606–613, 2016.

11. ***On the inertia set of a signed graph with loops***,
with Marina Arav and Hein van der Holst,
Linear Algebra and its Applications, 471: 169–183, 2015.

10. ***Minimum ranks of sign patterns via sign vectors and duality***,
with Marina Arav, Frank J. Hall, Zhongshan Li, Hein van der Holst, and Lihua Zhang,
Electronic Journal of Linear Algebra, 30: 360–371, 2015.

9. ***The combinatorial inverse eigenvalue problem II: All cases for small graphs***,
with Wayne Barrett, Curtis Nelson, and Tianyi Yang,
Electronic Journal of Linear Algebra, 27:742–778, 2014.

8. ***The combinatorial inverse eigenvalue problem: Complete graphs and small graphs with strict inequality***,
with Wayne Barrett, Anne Lazenby, Nicole Malloy, Curtic Nelson, William Sexton, Ryan Smith, and Tianyi Yang,
Electronic Journal of Linear Algebra, 26: 656–672, 2013.

7. ***Diagonal entry restrictions in minimum rank matrices***,
with Wayne Barrett, Nicole Malloy, Curtis Nelson, and William Sexton,
Electronic Journal of Linear Algebra 26: 300–332, 2013.

6. ***Decompositions of minimum rank matrices***,
with Wayne Barrett, Mark Kempton, Nicole Malloy, Curtis Nelson, and William Sexton,
Linear Algebra and its Applications, 438(10): 3913–3948, 2013.

5. ***Computing inertia sets using atoms***,
with Wayne Barrett, Steve Butler, H. Tracy Hall, Wasin So, Colin Starr, and Amy Yielding,
Linear Algebra and its Applications, 436(12): 4489–4502, 2012.

4. ***Minimum rank of outerplanar graphs***,
with Mark Kempton,
Linear Algebra and its Applications, 436(9): 3701-3720, 2012.

3. ***The minimum semidefinite rank of the complement of partial k-trees***,
with Hein van der Holst,
Linear Algebra and its Applications, 434(6): 1468-1474, 2011.

2. ***The inverse eigenvalues and inertia problems for minimum rank two graphs***,
with Wayne Barrett, Seth Gibelyou, Mark Kempton, Nicole Malloy, Curtis Nelson, and William Sexton,
Electronic Journal of Linear Algebra, 22: 389-418, 2011.

1. ***Maximum nullity of outerplanar graphs and the path cover number***,
Linear Algebra and its Applications, 432(8): 2052-2060, 2010.

Selected Talks and Seminars

The inertia bound is not always tight
International Linear Algebra Society Conference,
Leuven, Belgium, July 2016
Invited, Mini-symposium: combinatorial matrix theory.

Spectral properties of Paley 17
SIAM Discrete Math Conference
Atlanta, Georgia, June 2016

Invited, Mini-symposium: combinatorics and linear algebra applied to electrical engineering.

The inertia bound is not always tight
Western Canadian Linear Algebra Meeting
Manitoba, Canada, May 2016
Contributed, partial support provided by University of Manitoba.

The inertia bound for a graph is not always tight
Algebraic Graph Theory Seminar
University of Waterloo, April 2016

Minimum rank and outerplanar graphs
Discrete Mathematics Seminar
University of Rhode Island, December 2015
Honorarium, invitation by Department of Mathematics.

Linear Algebra + Graph Theory = FUN!
Algebraic Graph Theory Seminar
University of Waterloo, September 2015.

Minimum Rank Problems,
Rocky Mountain–Great Plains Graduate Research Workshop in Combinatorics,
Denver, Colorado, July 2014.
One of four post docs invited to present problems to the graduate students participating in the workshop funded by NSF grant no. 1415511.

Decomposing a Minimum Rank Matrix,
AMS Sectional Meeting,
Ames, Iowa, April 2013.
Invited, Special Session on Zero Forcing, Maximum Nullity/Minimum Rank, and the Colin de Verdiere Graph Parameters.

Inertia Set of an Outerplanar Graph,
AMS Sectional Meeting,
Lincoln, Nebraska, October 2011.
Invited, Special Session on Matrices and Graphs.

Outerplanar Graphs are a Nice Family of Graphs,
AMS Sectional Meeting,
St. Paul, MN, April 2010.
Invited, Special Session on Matrices and Graphs.

Outerplanar Graphs and Minimum Rank Problems,
The Netherlands Workshop on Graphs and Matroids,
Sittard, The Netherlands, July 2008.
Invited.

Maximum Nullity and Outerplanar Graphs,
International Linear Algebra Society Conference,
Cancun, Mexico, June 2008.
Contributed.

Funded Workshop/Conference Participation

Co-organizer of the *Rocky Mountain–Great Plains Graduate Research Workshop in Combinatorics* hosted by the University of Denver and University of Colorado Denver, July 27th–August 9th, 2014.
I was invited to participate in the two week workshop by Paul Horn of the University of Denver. The two week workshop was aimed at helping graduate students in combinatorics gain exposure to and experience with a variety of current problems in the field. In addition to presenting problems, I participated in a number of groups and lead one group. I attended planning and strategy meetings for the workshop, and helped fulfill workshop tasks. The paper *On the principal permanent rank characteristic sequences of graphs and digraphs* resulted from the workshop.

Participant of *NSF-CBMS Regional Research Conference: Combinatorial Zeta and L–functions*, Sundance Resort, Utah, May 2014. The invited speaker was Wen–Ching Winnie Li of Pennsylvania State University.

Participant of *NSF-CBMS Regional Research Conference: The Mutually Beneficial Relationship of Graphs and Matrices Workshop*, Iowa State University, July 2010. The invited speaker was Richard Brualdi of University of Wisconsin-Madison.
The paper *Computing Inertia Sets Using Atoms* was a result of the workshop.

Professional Service

Referee for

- *Linear Algebra and Its Applications*
- *Electronic Journal of Linear Algebra*
- *Discrete Math*