

# RICHARD HOSHINO

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## 1. Education

<b>Ph.D.</b>	Dalhousie University (Mathematics) <i>Thesis Title: Independence Polynomials of Circulant Graphs</i>	2008
<b>M.Sc.</b>	Dalhousie University (Mathematics) <i>Thesis Title: An Analysis of the Ehrenfeucht Game on Graphs</i>	2002
<b>B.Math</b>	University of Waterloo (Mathematics)	2001
<b>B.Ed.</b>	Queen's University (Education)	2001
<b>Research Interests</b>	<i>Operations Research</i> (e.g. scheduling optimization, data mining) <i>Discrete Mathematics</i> (e.g. graph theory, combinatorics)	

## 2. Employment History

### **National Institute of Informatics**

May 2010 to Present

*Post-Doctoral Fellow (Oct 2010 to present)*

*Research Assistant (May 2010 to Sept 2010)*

- Produced an optimal schedule for the 12-team Nippon (Japanese) Professional Baseball league, retaining all of the league's scheduling constraints while reducing 67,500 kilometres of total travel, as compared to the distance traveled by the teams during the 2010 season.
- Developed provably-optimal algorithms for multi-round scheduling based on graph theory.

### **Government of Canada**

January 2006 to January 2010

*Canada Border Services Agency (CBSA)*

*Manager, Mathematics and Data Exploration section*

- Established and managed a centralized Math Group to provide analytical services to the entire Canada Border Services Agency, collaborating with senior executives to identify projects where mathematics and statistics could be applied to improve border management.
- Produced an optimal scoring algorithm for biometric identification, leading to two invited presentations at international conferences on biometrics and artificial intelligence.
- Developed a new methodology to improve the efficiency of container inspection at CBSA marine ports, leading to the publication of a paper in the *Annals of Operations Research*.
- Created a new risk-scoring algorithm for high-risk marine containers, based on a statistical analysis of two years of historical data (3.8 million containers).
- Designed an optimized schedule for customs officers at an international airport, as well as a fully-customizable staff allocation model for land ports-of-entry that minimizes overall cost.
- Invited speaker at two U.S. conferences on counterterrorism and national security.
- Supervised and mentored 15 full-time and part-time employees since 2006.

### 3. Publications

#### Journal Publications

1. R. Hoshino and K. Kawarabayashi, Scheduling Bipartite Tournaments to Minimize Total Travel Distance, in progress.
2. R. Hoshino and K. Kawarabayashi, A Multi-Round Generalization of the Traveling Tournament Problem and its Application to Japanese Baseball, submitted to the European Journal of Operational Research.
3. J. I. Brown and R. Hoshino, Well-Covered Circulant Graphs, *Discrete Mathematics* **311** (2011) 244–251.
4. J. I. Brown and R. Hoshino, Proof of a Conjecture on Fractional Ramsey Numbers, *Journal of Graph Theory* **63** (2010) 164-178.
5. R. Hoshino et. al., Applications and Extensions of Cost Curves to Marine Container Inspection, *Annals of Operations Research* (2009) 1-25.
6. J. I. Brown and R. Hoshino, Independence Polynomials of Circulants with an Application to Music, *Discrete Mathematics* **309** (2009) 2292-2304.
7. J. I. Brown and R. Hoshino, Nordhaus-Gaddum Inequalities for the Fractional and Circular Chromatic Numbers, *Discrete Mathematics* **309** (2009) 2223-2232.
8. J. I. Brown and R. Hoshino, Line Graphs and Circulants, to appear in *Ars Combinatoria*.
9. J. I. Brown and R. Hoshino, Circulant Graphs Uniquely Characterized by their Independence Polynomials, to appear in *Ars Combinatoria*.
10. J. I. Brown and R. Hoshino, The Ehrenfeucht-Fraïssé Game for Paths and Cycles, *Ars Combinatoria* **83** (2007) 192-212.

#### Conference Publications

1. R. Hoshino and K. Kawarabayashi, The Inter-League Extension of the Traveling Tournament Problem and its Application to Sports Scheduling, submitted to the 25<sup>th</sup> AAAI Conference on Artificial Intelligence (2011).
2. R. Hoshino and K. Kawarabayashi, The Multi-Round Balanced Traveling Tournament Problem, to appear in the Proceedings of the 21<sup>st</sup> International Conference on Automated Planning and Scheduling (2011).
3. D. Gorodnichy, E. Dubrofsky, R. Hoshino, et. al., Exploring the Upper Bound Performance Limit of Iris Biometrics, to appear in the Proceedings of the SSCI CIBIM-IEEE Workshop on Computational Intelligence in Biometrics and Identity Management (2011).
4. R. Hoshino, R. W. Oldford, M. Zhu, Two-stage Approach for Unbalanced Classification with Time-varying Decision Boundary: Application to Marine Container Inspection, Proceedings of the ACM SIG-KDD Workshop on Intelligence and Security Informatics (2010).
5. D. Gorodnichy and R. Hoshino, Score Calibration for Optimal Biometric Identification, Proceedings of the 23<sup>rd</sup> Canadian Conference on Artificial Intelligence (2010).
6. D. Gorodnichy and R. Hoshino, Calibrated Confidence Scoring for Biometric Identification, Proceedings of the NIST International Conference on Biometric Performance (2010).

#### Non-Academic Publications

1. Contributing Author in Notes from Canada's Young Activists: A Generation Stands Up For Change, Douglas & McIntyre, 2007.
2. R. Hoshino and J. Grant McLoughlin, Combinatorial Explorations, *Canadian Mathematical Society ATOM Series*, 2005.

## 4. Teaching Experience

- Math 1010 at Dalhousie University, a first-year calculus course  
(recipient of the university's award for Teaching Excellence in 2002)
- Math 2790 at Dalhousie University, a second-year course on Mathematical Problem-Solving
- C&O 380 at the University of Waterloo, a third-year course on Mathematical Problem-Solving  
(recipient of the university's award for Distinguished Teaching in 2001)

## 5. Selected Awards and Scholarships

- One of 150 public servants chosen for *canada@150*, a national initiative for future leaders to identify and develop solutions to key policy challenges facing Canada (2008-09).
- Entered the Government of Canada through the Recruitment of Policy Leaders Program, as one of thirty recruits chosen from over a thousand applicants (2006).
- NSERC Canada Graduate Scholarship, the top federal scholarship given to graduate students in Canada (2003-05).
- Izzak Walton Killam Scholarship, the top graduate scholarship at Dalhousie (2003-05).
- Action Canada Fellowship, a national program that identifies and develops the country's twenty "best and brightest" emerging leaders (2003).
- NSERC Post-Graduate Scholarship (2001-03).
- Honorable Mention, Putnam Mathematics Competition (1999, 2000).
- K.D. Fryer Scholarship, the top undergraduate scholarship at Waterloo (1996-2000).
- Silver Medalist at the 37<sup>th</sup> International Mathematical Olympiad (*IMO*) in India (1996).
- Second place in Canada, Canadian Mathematical Olympiad (1996).

## 6. Service

- Active member and volunteer for the Canadian Mathematical Society (1997-present).
- Member of the Problems Committee for the Canadian Open Math Challenge (2011-present), the Grade 12 Euclid Math Contest (1998-2008), the Canadian Math Olympiad (2001-02, 2004-06), and the Asian-Pacific Math Olympiad (2002-04).
- Referee for the Annals of Operations Research, Discrete Applied Mathematics, Graphs and Combinatorics (2008-present).
- Tutor for Discovery University, a university-level humanities course for Ottawa residents living below the poverty line (2008-09).
- Founder and Director of the Nova Scotia High School Math League (2002-2004), a Saturday morning mathematics program with over 400 participants across Nova Scotia.
- Founder and Director of the Dalhousie Math Circles Outreach Program (2002-2004), an evening outreach program for local high school students which recently received a \$400,000 grant to expand the program to the entire province.
- Director of the Canadian Mathematical Society National Camp for the top Grade 9 and 10 high school students in Canada (1999-2004).
- Member of Search Committee for the Director of the Centre for Learning and Teaching at Dalhousie University (2004).
- Co-organizer of the Education Session at the Summer Meeting of the Canadian Mathematical Society (2004).
- Deputy Leader of Canada's team to the 44<sup>th</sup> IMO in Tokyo, Japan (2003).
- Coach of the Dalhousie University Putnam team (2001-03).
- Deputy Leader Observer of Canada's team to the 42<sup>nd</sup> IMO in Washington D.C. (2001).

## 7. Invited Presentations

<sup>KS</sup> denotes “keynote speaker”

### Conference Talks

- *International Conference on Automated Planning and Scheduling*, University of Freiburg, Germany, June 2011.
- *Canadian Mathematical Society Winter Meeting*, University of British Columbia, December 2010 (two talks).
- *Conference on Port Security, Inspection, Risk Analysis and Modeling*, Rutgers University, November 2008.
- *Canadian Mathematical Society Winter Meeting*, York University, December 2006.
- *Mathematical Methods in Counterterrorism Conference*, Washington D.C., September 2006.
- *Canadian Undergraduate Mathematics Conference*<sup>KS</sup>, McGill University, July 2006.
- *Canadian Undergraduate Mathematics Conference*<sup>KS</sup>, Queen’s University, July 2005.
- *Canadian Mathematical Society Summer Meeting*, Dalhousie University, June 2004.
- *East Coast Combinatorics Conference*, University of Prince Edward Island, October 2002.

### Seminar Talks

- *Combinatorics Workshop*, Keio University, February 2011.
- *Discrete Mathematics Group*, University of Ottawa, November 2009.
- *Text Analysis and Machine Learning*, University of Ottawa, February 2009.
- *Artificial Intelligence Group*, University of Alberta, December 2008.
- *Information Technology Group*, National Research Council, November 2008.
- *Computational Mathematics Colloquium*, University of Waterloo, April 2008.
- *Laboratory for Port Security*, Rutgers University, November 2006.
- *Graduate Student Colloquium*, seminar at Dalhousie University, March 2005.
- *East Coast Combinatorics Group*, seminar at Dalhousie University, November 2004.
- *Undergraduate Colloquium*, seminar at the University of New Brunswick, March 2004.
- *Pure Math Colloquium*, seminar at the University of Waterloo, November 2003.
- *Honors Colloquium*, seminar at Acadia University, September 2003.

### Talks on Mathematics Education

- *Mathematics Education Research Unit*, University of Ottawa, September 2009.
- *Mathematics Education Research Unit*, University of Ottawa, January 2009.
- *Summer Institute for Teachers of Mathematics*, University of Waterloo, August 2006.
- *Summer Institute for Teachers of Mathematics*, University of Waterloo, August 2005.
- *Ontario Association of Mathematics Educators*<sup>KS</sup>, conference in Toronto, February 2005.
- *Nova Scotia Math Teachers Association*, conference in Truro, October 2003.
- *Canadian Math Education Study Group*, conference at Acadia University, June 2003.
- *University Teaching and Learning*, conference at Dalhousie University, May 2003.
- *Nova Scotia Math Teachers Day*<sup>KS</sup>, workshop at St. FX University, March 2003.
- *New Experiences in Teaching Math*, conference at Mount Allison University, October 2002.
- *Society for Teaching and Learning in Higher Education*, conference at McMaster University, June 2003.
- *University Teaching and Learning*, conference at Dalhousie University, May 2002.
- *Ontario Association of Mathematics Educators*, conference in Toronto, May 1999-2001.
- Invited speaker at 17 high schools in Ottawa and Nova Scotia (2003-09).
- Conducted 10 workshops for high school teachers in Atlantic Canada (2003-04).

## 8. Personal Information

<b>Date of Birth</b>	June 15 <sup>th</sup> , 1978
<b>Citizenship</b>	Canadian
<b>Current Residence</b>	Makuhari City, Chiba Prefecture, Japan
<b>Languages</b>	Fluent English, fluent French, and conversational Japanese

## 9. References

- Ken-ichi Kawarabayashi, Ph.D.  
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National Institute of Informatics, Tokyo, Japan  
[k\\_keniti@nii.ac.jp](mailto:k_keniti@nii.ac.jp)
- Jason I. Brown, Ph.D.,  
Professor, Department of Mathematics and Statistics  
Dalhousie University, Halifax, Nova Scotia, Canada  
[brown@mathstat.dal.ca](mailto:brown@mathstat.dal.ca)
- Diane Keller, P.Eng.  
Director General, Laboratory and Scientific Services,  
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