

JAMES G. PROPP

Department of Mathematics and Statistics
University of Massachusetts Lowell
E-mail: JamesPropp@gmail.com

Kennedy College of Sciences
Lowell, MA 01854
Homepage: <http://jamespropp.org>

EMPLOYMENT

University of Massachusetts Lowell, Professor, 2006 to present
Tufts University, Visiting Professor of Mathematics and Computer Science, 2014–2015
Microsoft New England Research Lab, Visiting Researcher, 2014–2015
Mathematical Sciences Research Institute, Einsenbud Visiting Scholar, Spring 2012;
Research Professor, Fall 1996; Visiting Postdoctoral Fellow, Fall 1992
University of California Berkeley, Chancellor’s Visiting Professor, Spring 2012;
Adjunct Assistant Professor, 1988 to 1990
Microsoft Research Laboratories, Consulting Researcher, Summer 2011
University of Wisconsin at Madison, Associate Professor, 1999 to 2006;
Assistant Professor, 1998 to 1999
Brandeis University, Visiting Associate Professor, Fall 2002 to Spring 2003
Harvard University, Visiting Associate Professor, Fall 2001 to Spring 2002
Olin College, Visiting Associate Professor, Fall 2000
Massachusetts Institute of Technology, Visiting Scholar, 1998 to 1999 and Fall 2000;
Associate Professor, 1996 to 1998; Assistant Professor, 1990 to 1996;
AT&T Bell Laboratories, consultant, summers of 1991 and 1992
University of Maryland, Visiting Professor, 1987 to 1988

EDUCATION

Ph.D., Mathematics, 1987, University of California at Berkeley (research in ergodic theory supervised by Jacob Feldman; thesis entitled *Coding from the Past*)
Certificate of Advanced Study, 1983, Cambridge University (Part III Maths Tripos)
A.B., Mathematics, 1982, Harvard College (Magna cum laude, Phi Beta Kappa)

SCHOLARSHIPS, AWARDS, AND GRANTS

Simons Collaboration Grant, 2019–2024
Mathematical Association of America Trevor Evans Award, 2018
American Mathematical Society Honorary Fellowship, Class of 2016
National Science Foundation Grant for Research in Mathematics, 1992–1995, 1995–1998, 1999–2002, 2006–2009, and 2010–2016
NSF Supplementary Grant for Research Experiences for Undergraduates, 1995–1996 and 1997–1998
National Security Agency Grant for Research in Mathematics, 1992–1995, 1995–1998, 1999–2001, and 2004–2006

SCHOLARSHIPS, AWARDS, AND GRANTS (continued)

UMass Lowell Department of Mathematical Sciences Teaching Excellence Award, 2007–2008

Institute for Operations Research and the Management Sciences (INFORMS)
College on Simulation's Outstanding Simulation Publication Award, 2000
(awarded jointly to David Wilson)

MIT Class of 1922 Career Development Professorship, 1995–1998

Phi Beta Kappa of Northern California Award for Excellence in Teaching, 1990

NSF Postdoctoral Research Fellowship in Mathematics, 1987–1990

PUBLICATIONS (available through my homepage and the arXiv)

Tilings of benzels via the abacus bijection (with Colin Defant, Rupert Li, and Benjamin Young), submitted to *Combinatorial Theory*

A pentagonal number theorem for tribone tilings (with Jesse Kim), submitted to the *Electronic Journal of Combinatorics*

Trimer covers in the triangular grid: twenty mostly open problems, to appear in the *Proceedings of the 2022 Conference on Open Problems in Algebraic Combinatorics*

Some 2-adic conjectures concerning polyomino tilings of Aztec diamonds, to appear in *Integers*

A greedy chip-firing game (with Rupert Li), *Random Structures and Algorithms*, November 2022

The muffin curse, *Math Horizons* **29**(3) (2022), 16–19

Conway's Tiling Groups (with R. Kenyon and J. Lagarias), *Notices of the American Mathematical Society*, Volume 69, No. 7, August 2022, pages 1148-1151

The Genius Box, *Journal of Humanistic Mathematics* **11**(2) (2021), 451–464

Combinatorial, piecewise-linear, and birational homomesy for products of two chains (with D. Einstein), *Algebraic Combinatorics*, **4**(2) (2021), 201–224

Conway's influence on the study of random tilings, *Mathematical Intelligencer* **43**(2) (2021), 40–46

Germ order for one-dimensional packings (with Aaron Abrams, Henry Landau, Zeph Landau, Jamie Pommersheim, and Alexander Russell); *Online Journal of Analytic Combinatorics*, Issue 16 (2021)

Brussels sprouts, noncrossing trees, and parking functions (with Caleb Ji), *Enumerative Combinatorics and Applications* **1**(1) (2021), #S2R1

The square root of pi, *Math Horizons* **28**(3) (2021), 14–17

The combinatorics of frieze patterns and Markoff numbers, *Integers* **20** (2020), #A12

Quantifying noninvertibility in discrete dynamical systems, *Electronic Journal of Combinatorics* **27**(3) (2020), #P3.51

Who mourns the tenth Heegner number?, *Math Horizons* **27**(2) (2019), 18–21; republished in Princeton University Press, *Best Writing on Mathematics 2020*

PUBLICATIONS (continued)

- Prof. Engel's marvelously improbable machines, *Math Horizons* **26**(2) (2018), 5–9; republished in Princeton University Press, Best Writing on Mathematics 2019
- Sorting via chip-firing (with S. Hopkins and T. McConville), *Electronic Journal of Combinatorics*, **24**(3) (2017), #P3.13
- The paintball party, *Math Horizons* **25**(2) (2017), 18–21
- Formation of an interface by competitive erosion (with S. Ganguly, L. Levine, and Y. Peres), *Probability Theory and Related Fields*, **168** (2017), 455–509
- Noncrossing Partitions, Toggles, and Homomesies (with D. Einstein, M. Farber, E. Gunawan, M. Joseph, M. Macauley, and S. Rubinstein-Salzedo), *Electronic Journal of Combinatorics*, **23**(3) (2016), #P3.52
- What I learned from Richard Stanley, the Stanley Festschrift (AMS, 2016)
- Homomesy in products of two chains (with T. Roby), *Electronic Journal of Combinatorics*, **22**(3) (2015), #P3.4
- Enumeration of Tilings (book chapter); pages 541–588 in *The Handbook of Enumerative Combinatorics* (CRC Press, 2015)
- Real analysis in reverse, *American Mathematical Monthly* **120** (2013), 392–408
- Equivalence classes of permutations under various relations generated by constrained transpositions (with S. Linton, T. Roby, and J. West), *Journal of (Integer Sequences)*, **15** (2012), #12.9.1
- Local-to-global principles for the hitting sequence of a rotor walk (with G.P. Giacaglia, L. Levine, and L. Zayas-Palmer), *Electronic Journal of Combinatorics*, **19**(1) (2012), #P5
- A Galois connection in the social network, *Mathematics Magazine*, **85**(1) (2012), 34–36
- Tiling lattices with sublattices, I (with D. Feldman and S. Robins), *Discrete and Computational Geometry* **46** (2011), 184–186
- What is ... a sandpile? (with L. Levine), *Notices of the AMS*, **57**(8) (2010), 976–979
- Rotor walks and Markov chains (with A. Holroyd), *Algorithmic Probability and Combinatorics*; American Mathematical Society (2010), 105–126
- Discrete analog computing with rotor-routers, *Chaos* **20**(3) (2010)
- A counterexample to integration by parts (with A. Kheifets), *Mathematics Magazine* **83**(3) (2010), 222–225
- Perfect matchings for the three-term Gale-Robinson sequences (with M. Bousquet-Melou and J. West), *Electronic Journal of Combinatorics* **16**(1) (2009), R125
- Coupling from the past (with D. Wilson), published as Chapter 22 (pp. 287–297) in the book “Markov Chains and Mixing Times” by D. Levin, Y. Peres, and E. Wilmer, American Mathematical Society (2008)
- Chip-firing and rotor-routing on directed graphs (with A. E. Holroyd, L. Levine, K. Meszaros, Y. Peres, and D. B. Wilson), “In and out of Equilibrium II”, eds. V. Sidoravicius and M. E. Vares, *Progress in Probability* **60** (2008), 331–364

PUBLICATIONS (continued)

- Topological entropy for nonuniformly continuous maps (with B. Hasselblatt and Z. Nitecki), *Discrete and Continuous Dynamical Systems* **22**, 201–213 (2008)
- Degree-growth of monomial maps (with B. Hasselblatt) *Ergodic Theory and Dynamical Systems* **27**, 1375–1397 (2007)
- Combinatorial interpretations for rank-two cluster algebras of affine type (with G. Musiker), *Electronic Journal of Combinatorics* **14** (2007), R15
- In search of Robbins stability (with K. Kedlaya), *Advances in Applied Mathematics* **34**, 659–668 (2005)
- Lambda-determinants and domino-tilings, *Advances in Applied Mathematics* **34**, 871–879 (2005)
- Generalized domino-shuffling, *Theoretical Computer Science* **303**, 267–301 (2003)
- Exponentiation and Euler measure, *Algebra Universalis* **49**, 459–471 (2003)
- Generating a random sink-free orientation in quadratic time (with H. Cohn and R. Pemantle), *Electronic Journal of Combinatorics*, **9(1)** (2002), R10
- The many faces of alternating-sign matrices, *Discrete Mathematics and Theoretical Computer Science Proceedings AA (DM-CCG)*, 43–58 (2001)
- A reciprocity theorem for domino tilings, *Electronic Journal of Combinatorics*, **8(1)** (2001), R18
- A variational principle for domino tilings (with H. Cohn and R. Kenyon), *Journal of the American Mathematical Society* **14**, 297–346 (2001)
- Trees and matchings (with R. Kenyon and D. Wilson), *Electronic Journal of Combinatorics*, **7(1)** (2000), R25
- Three-player impartial games, *Theoretical Computer Science* **233**, 263–278 (2000)
- How the alternating-sign matrix conjecture was solved (with D. Bressoud), *Notices of the American Mathematical Society* **46**, 637–646 (1999)
- Combinatorial games under auction play (with A. Lazarus, D. Loeb, W. Stromquist, D. Ullman), *Games and Economic Behavior* **27**, 229–264 (1999)
- Domino tiling with barriers (with R. Stanley), *Journal of Combinatorial Theory, Series A* **87**, 347–356 (1999)
- Enumeration of matchings: problems and progress, in: *New perspectives in geometric combinatorics*, L. Billera et al. eds., *Mathematical Sciences Research Institute series*, vol. 38, Cambridge University Press, 1999
- Microsurveys in Discrete Probability* (book), edited with D. Aldous, *DIMACS Series in Discrete Mathematics and Theoretical Computer Science* **41**, American Mathematical Society, 1998
- How to get a perfectly random sample from a generic Markov chain and generate a random spanning tree of a directed graph (with D. Wilson), *Journal of Algorithms* **27**, 170–217 (1998)

PUBLICATIONS (continued)

- Coupling from the past: a user's guide (with D. Wilson), in: *Microsurveys in Discrete Probability* (see above), 181–192
- The shape of a typical boxed plane partition (with H. Cohn and M. Larsen), *New York Journal of Mathematics* **4**, 137–165 (1998)
- A pedestrian approach to a method of Conway, or, a tale of two cities, *Mathematics Magazine* **70**, 327–340 (1997)
- Boundary-dependent local behavior for 2-D dimer models, *International Journal of Modern Physics B* **11**, 183–187 (1997)
- Generating random elements of finite distributive lattices, *Electronic Journal of Combinatorics* **4(2)** (1997), R15
- Richman games (with A. Lazarus, D. Loeb, and D. Ullman), in *Games of No Chance*, R. Nowakowski, ed., Mathematical Sciences Research Institute Publications no. 29, Cambridge University Press, 1996
- Exact sampling with coupled Markov chains and applications to statistical mechanics (with D. Wilson), *Random Structures and Algorithms* **9**, 223–252 (1996)
- Local statistics for random domino tilings of the Aztec diamond (with H. Cohn and N. Elkies), *Duke Mathematical Journal* **85**, 117–166 (1996)
- The fundamental group of a Z^2 shift (with W. Geller), *Ergodic Theory and Dynamical Systems* **15**, 1091–1118 (1995)
- The fractional chromatic number of Mycielski's graphs (with M. Larsen and D. Ullman), *Journal of Graph Theory* **19**, 411–416 (1995)
- A new take-away game, in *The Lighter Side of Mathematics*, R. Guy and R. Woodrow, eds., Mathematical Association of America, 1994
- Producing new bijections from old (with D. Feldman), *Advances in Mathematics* **113**, 1–44 (1995)
- Further travels with my ant (with D. Gale, S. Sutherland, and S. Troubetzkoy), *Mathematical Entertainments column, Mathematical Intelligencer* **17**, #3, 48–56 (1995)
- Further ant-ics, *Mathematical Entertainments column, Mathematical Intelligencer* **16**, #1, 37–42 (1994)
- A linear Ramsey theorem (with D. Feldman), *Advances in Mathematics* **95**, 1–7 (1992)
- Alternating sign matrices and domino tilings (with N. Elkies, G. Kuperberg, and M. Larsen), *Journal of Algebraic Combinatorics* **1**, 111–132, 219–234 (1992)
- On the cookie game (with D. Ullman), *International Journal of Game Theory* **20**, 313–324 (1992)
- On tensor powers of integer programs (with R. Pemantle and D. Ullman), *SIAM Journal of Discrete Mathematics* **5**, 127–143 (1992)
- Coding Markov chains from the past, *Israel Journal of Mathematics* **75**, 289–328 (1991)
- A Shannon-McMillan theorem for motley names, *Israel Journal of Mathematics* **69**, 225–234 (1990)

PUBLICATIONS (continued)

What are the laws of greed?, *American Mathematical Monthly* **96**, 334–336 (1989)

Some variants of Ferrers diagrams, *Journal of Combinatorial Theory Ser. A* **52**, 98–128 (1989)

Kepler's spheres and Rubik's cube, *Mathematics Magazine* **61**, 231–239 (1988)

Greedily partitioning the natural numbers into sets free of arithmetic progressions (with J. Gerver and J. Simpson), *Proceedings of the American Mathematical Society* **102**, 765–772 (1988)

Nim for three: an overview and an offer of alcohol, *Eureka* No. 43, Easter 1983, 41–46