

CURRICULUM VITAE OF BENJAMIN STEINBERG

Current Academic Department of Pure Mathematics
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Date of Birth: November 20, 1972.
Citizenship: United States
Marital Status: Single

EDUCATION

Ph.D. Mathematics, University of California at Berkeley, May 1998.
B.A. Rice University, Houston, Texas, May 1994.

SPECIALIZATION

Finite Semigroups, Inverse Semigroups, Combinatorial Group Theory, Theory of Computation and Finite State Automata

RELATED INTERESTS

Categories, Groupoids, and Theoretical Computer Science

DISSERTATION

Title: *Decidability and Hyperdecidability of Joins of Pseudovarieties*
Committee: John Rhodes (chair), John Stallings, Terry Speed.

ACADEMIC HONORS

NSF-NATO Fellowship, Fall 1999, Spring 2000; PRAXIS Fellowship, Fall 1998, Spring 1999; NSF-NATO Fellowship Honorable Mention, Spring 1998; U.C. Berkeley Nominee for Sloan Dissertation, Spring 1997; U.C. Berkeley Math. Dept. Block Grant, Spring 1996, Spring 1997; Graduate Student Instructorship, 1994-1998; NSF Graduate Student Fellowship Nominee, 1994, 1995; DOD Fellowship Nominee, 1994; Phi Beta Kappa, 1994; Rice University Award for Best Science and Engineering Junior, 1993; National Merit Scholar, 1990-1994.

TEACHING EXPERIENCE

- Auxiliary Professor, University of Porto:
Elements of Mathematics I, Fall 2001.
Algebra I, Fall 2001.
Complex Analysis, Fall 2001.
4th-year Algebra: Combinatorial Group Theory, Spring 2001.
Linear Algebra II, Spring 2001.
- Lecturer, University of California at Berkeley.
Math 113 (Introduction to Abstract Algebra), Summer 1998.
- Graduate Student Instructor, University of California at Berkeley.
Math 54W/54 (Linear Algebra and Differential Equations), Fall 1997/Spring 1995.

CS172 (Theory of Computation), Spring 1997.

Math 55 (Discrete Mathematics), Fall 1996.

Math 1B (One Variable Calculus), Fall 1995.

Math 1A (One Variable Calculus), Fall 1994.

- Summer School Teacher, Lowell High School, San Francisco.
Geometry 1, Summer 1996.
Geometry 2, Summer 1996.

LANGUAGES

- Portuguese, French and Spanish

REFERENCES

- Prof. John Rhodes
University of California at Berkeley
e-mail: rhodes@math.berkeley.edu
- Prof. John Stallings
University of California at Berkeley
e-mail: stall@math.berkeley.edu
- Prof. Jorge Almeida
University of Porto
e-mail: jalmeida@fc.up.pt
- Prof. Stuart Margolis
Bar Ilan University
e-mail: margolis@macs.biu.ac.il

PROFESSIONAL ACTIVITIES

Publications

- M. Delgado, S. W Margolis and B. Steinberg, *Combinatorial group theory, inverse monoids, automata, and global semigroup theory*, Internat. J. Algebra and Comput. **12** (2002), 179–211.
- J. Rhodes and B. Steinberg, *Profinite semigroups, varieties, expansions, and the structure of relatively free profinite semigroups*, Internat. J. Algebra and Comput. **11** (2002), 627–672.
- B. Steinberg, *Inverse automata and profinite topologies on a free group*, J. Pure Appl. Algebra **167** (2001), 341–359.
- B. Steinberg, *Finite state automata: A geometric approach*, Trans. Amer. Math. Soc. **353** (2001), 3409–3464.
- B. Steinberg, *Factorization theorems for morphisms of ordered groupoids and inverse semigroups*, Proc. Edinburgh Math. Soc. **44** (2001), 549–569.
- B. Steinberg, *Inevitable graphs and profinite topologies: Some solutions to algorithmic problems in monoid and automata theory, stemming from group theory*, Internat. J. Algebra and Comput. **11** (2001), 25–71.
- B. Steinberg, *A note on amalgams of inverse semigroups*, J. Austral. Math. Soc. **70** (2001), 71–75.
- B. Steinberg, *Algorithmic problems for joins of pseudovarieties*, Semigroup Forum **62** (2001), 1–40.
- B. Steinberg, *A note on the equation $\mathbf{PH} = \mathbf{J} * \mathbf{H}$* , Semigroup Forum, **63** (2001), 469–474.
- B. Steinberg, *A delay theorem for pointlikes*, Semigroup Forum, **63** (2001), 281–304.
- B. Steinberg, *Inverse semigroup homomorphisms via partial group actions*, Bull. Austral. Math. Soc. **64** (2001), 157–168.
- J. Almeida and B. Steinberg, *On the decidability of iterated semidirect products with applications to complexity*, Proc. London Math. Soc. **80** (2000), 50–74.
- B. Steinberg, *Fundamental groups, inverse Schützenberger automata, and monoid presentations*, Comm. in Algebra **28** (2000), 5235–5253.

- B. Steinberg, *Polynomial closure and topology*, Internat. J. Algebra and Comput. **10** (2000), 603–624.
- J. Almeida and B. Steinberg, *Syntactic and global semigroup theory, a synthesis approach* in “Algorithmic Problems in Groups and Semigroups,” edited by J. -C. Birget, S. Margolis, J. Meakin, and M. Sapir, Birkhauser, 2000, 1–23.
- B. Steinberg, **PG = BG: Redux** in Proceedings of the International Conference on Semigroups, edited by P. Smith, E. Giraldez, and P. Martins, World Scientific, Singapore, 2000, 181–190.
- B. Steinberg, *Monoid kernels and profinite topologies on the free Abelian group*, Bull. Austral. Math. Soc. **60** (1999), 391–402.
- B. Steinberg, *Semidirect products of categories with applications*, J. Pure Appl. Algebra **142** (1999), 153–182.
- J. Rhodes and B. Steinberg, *Pointlike sets, hyperdecidability, and the identity problem for finite semigroups*, Internat. J. Algebra and Comput. **9** (1999), 475–481.
- B. Steinberg, *Parallel computation: The join of pseudovarieties*, in “Algebraic Engineering,” edited by C. Nehaniv, M. Ito, World Scientific, Singapore, 1999, 302–315.
- B. Steinberg, *On pointlike sets and joins of pseudovarieties*, Internat. J. Algebra and Comput. **8** (1998), 203–231.
- K. Auinger and B. Steinberg, *On the extension problem for partial permutations*, Proc. Amer. Math. Soc., to appear.
- B. Steinberg, *A topological approach to inverse and regular semigroups*, Pacific Journal of Mathematics, to appear.
- P. V. Silva and B. Steinberg, *Extensions and subsemigroups of automatic monoids*, Theor. Comp. Sci., to appear.
- R. Gitik, S. W. Margolis and B. Steinberg, *On the Kurosh theorem and separability properties*, J. Pure Appl. Algebra, to appear.
- B. Steinberg, *Partial actions of groups on cell complexes*, Monatshefte für Mathematik, to appear.
- B. Steinberg and B. Tilson, *Categories as algebra 2*, Internat. J. Algebra Comput., to appear.
- B. Steinberg, *McAlister’s P-theorem via Schützenberger graphs*, Comm. in Algebra, to appear.
- B. Steinberg, *A sampler of a topological approach to inverse semigroups*, Proceedings of the Thematic Term on Semigroups, Algorithms, Automata and Languages at Coimbra, Portugal 2001, to appear.
- S. W. Margolis and B. Steinberg, *Power semigroups and polynomial closure*, to appear in the Proceedings of the Third International Colloquium on Words, Languages and Combinatorics, Kyoto.
- K. Auinger, G. M. S. Gomes, V. Gould and B. Steinberg, *An application of a theorem of Ash to finite covers*

Preprints

- K. Auinger and B. Steinberg, *The geometry of profinite graphs with applications to free groups and finite monoids* — about 50 pages.
- B. Steinberg, *The uniform word problem for groups and finite Rees quotients of E-unitary inverse semigroups*
- P. V. Silva and B. Steinberg, *A geometric characterization of automatic monoids*
- M. V. Lawson, S. W. Margolis and B. Steinberg, *Expansions of inverse semigroups*
- B. Steinberg, *Building inverse semigroups from group actions*

Work in progress

- B. Steinberg, *The lifting and classification problems for subspaces of covering spaces*
- J. Rhodes and B. Steinberg, *The q-theory of finite semigroups* — will be book length when finished.
- M. V. Lawson and B. Steinberg, *Étendues and ordered groupoids*

Presented Papers — 50+ minutes

- “The q-theory of finite semigroups”

International Workshop on Semigroups, Automata, and Formal Languages
Crema, Italy, June 2002

- “A topological approach to inverse semigroups”
Invited speaker
Thematic Term on Semigroups, Algorithms, Automata and Languages,
Coimbra, Portugal, July 2001
- “Categories as Algebra II”
Invited speaker
Colloquium on Semigroups,
University of Szeged, Szeged, Hungary, July 2000
- “Free products of LERF groups: Revisited”
Invited speaker
Conference on Geometric and Combinatorial Methods in Group Theory and Semigroup Theory,
University of Nebraska, Lincoln, May 2000
- “On the equation $\mathbf{J} * \mathbf{H} = \mathbf{J}m\mathbf{H}$ for pseudovarieties of groups \mathbf{H} ”
The Second Semigroup Conference of St. Petersburg,
Russian State Hydrometeorological University, St. Petersburg, Russia, June 1999
- “On iterated semidirect products of pseudovarieties of semigroups with applications to complexity”
Invited speaker
Conference on Algorithmic Problems in Groups and Semigroups,
University of Nebraska, Lincoln, May 1998

Presented Papers — shorter talks

- “The q -theory of finite semigroups”
Joint meeting of the AMS-UMI
Pisa, Italy, June 2002
- “Undecidability in extending partial permutations”
International Conference On Modern Algebra,
Vanderbilt University, Nashville, USA, June 2002
- “Polynomial closure and topology”
Third International Colloquium on Words, Languages and Combinatorics,
Kyoto-Sangyo University, Kyoto, Japan, March 2000
- “Geometric automata theory and pseudovariety equations”
International Conference on Semigroups,
Braga, Portugal, June 1999
- “Hyperdecidability: examples and counterexamples”
First Meeting of the Project Algebra, Geometry, and Combinatorics,
Braga, Portugal, June 1997
- “Parallel computation: The join of pseudovarieties”
First International Conference on Semigroups and Algebraic Engineering,
Aizu-Wakematsu, Japan, March 1997.

Participation in Workshops

- “The delay theorem for pointlikes”
Workshop on combinatorics, semigroups, and words.
Kyoto-Sangyo University, Kyoto, Japan, March 2000
- “Automata and language theoretic methods in combinatorial and geometric group theory”
Bar Ilan University, Ramat Gan, Israel, December 1999
- “Workshop on inverse semigroups and quasicrystals”
University of Essex, Colechester, England, July/August 1999

Other professional activities

- Organizer of an International Conference on Semigroups and Groups in honor of the 65th birthday of John Rhodes.
Porto, Portugal, June 2002
- Served as a referee for Internat. J. Algebra and Comput., J. Pure Appl. Algebra, Comm. Algebra, and Theor. Comp. Sci.
- Organizer of the Semigroup Seminar at the University of Porto, 1999-2002 and of the General Seminar, 2001-2002.
- Mentor for the New Talents in Mathematics program of the Gulbenkian foundation. This involves weekly meetings with a gifted undergraduate student in an attempt to introduce the student to advanced mathematics and research.
- I have given various seminars at the University of Paris VII and the University of Porto; I have also given talks at John Stallings's seminar at Berkeley and at the Universities of Bar Ilan, York, Newcastle, Bangor, and Lisbon, as well as the Instituto Superior Técnico of Lisbon.