ERIC W. ALLENDER

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CURRENT POSITION:

2008 to present	Professor (P2), Department of Computer Science, Rutgers University, New Brunswick, New Jersey. Member of the Graduate Faculty, Member of the DIMACS Center for Discrete Mathematics and Theoretical Computer Science (since 1989), Member of the Graduate Faculty of the Mathematics Department (since 1993).
1997 to 2008	Professor (P1), Department of Computer Science, Rutgers University, New Brunswick, New Jersey.
1991 to 1997	Associate Professor, Department of Computer Science, Rutgers University, New Brunswick, New Jersey.
1985 to 1991	Assistant Professor, Department of Computer Science, Rutgers University, New Brunswick, New Jersey.

VISITING POSITIONS:

Mar–June 1997	Gastprofessor, Wilhelm-Schickard-Institut für Informatik, Universität Tübingen, Germany.
Dec. 96–Feb. 97	Visiting Scholar, Department of Theoretical Computer Science, Institute of Mathematical Sciences, Chennai (Madras), India.
1992–1993	Visiting Research Scientist, Department of Computer Science, Princeton University.
May – July 1989	Gastdozent, Institut für Informatik, Universität Würzburg, West Germany.

RESEARCH INTERESTS:

My research interests lie in the area of computational complexity, with particular emphasis on parallel computation, circuit complexity, Kolmogorov complexity, and the structure of complexity classes.

EDUCATION:

Ph. D., 1985 — Georgia Institute of Technology, Atlanta, Georgia, School of Information and Computer Science.
Dissertation entitled *Invertible Functions*. K. N. King, advisor.
(President's Fellowship, 1980-1981.)

B. A., 1979 — University of Iowa, Iowa City, Iowa, Computer Science/Theatre (double major).
Graduated with highest honors. Phi Beta Kappa, 1978. Omicron Delta Kappa, 1978.

RESEARCH SUPPORT:

NSF Grant, *Collaborative Research: Understanding, Coping with, and Benefiting from, Intractability*, 2008–2013 ($10,000,000) (co-PI). Collaborative Research Grant with three other institutions.

NSF Grant, *Computational Complexity Theory and Circuit Complexity*, 2008–2011 ($300,800).

NSF Grant, *FRG: Collaborative Research: Algorithmic Randomness*, 2007–2010 ($559,094) (co-PI). Collaborative Research Grant with ten other institutions.

NSF Grant, *Computational Complexity Theory and Circuit Complexity*, 2005–2008 ($200,000).

NSF Grant, *Computational Complexity Theory and Circuit Complexity*, 2001–2004 ($268,038).

NSF Grant, *Computational Complexity Theory and Circuit Complexity*, 1998–2001 ($238,301).

Deutsche Forschungsgemeinschaft Grant, 1997 (22,483.39 DM).

NSF Grant, *Computational Complexity Theory and Circuit Complexity*, 1995–1998 ($210,000).

NSF Grant, *Computational Complexity Theory and Circuit Complexity*, 1992–1995 ($216,909)

NSF Grant, *Computational Complexity Theory and Circuit Complexity*, 1990–1992 ($53,277).

NSF Research Initiation Grant, *Applications of Kolmogorov Complexity: Pseudorandom Generators, Circuit Complexity, and One-Way Functions*, 1988–1990 ($31,207).

HONORS:

Fellow of the ACM, 2007.

ACM Distinguished Scientist, 2006.

DOCTORAL STUDENTS SUPERVISED:

Sambuddha Roy, 2006 (Now at IBM India Research Laboratory)

Detlef Ronneburger, 2004 (Now at York College, CUNY)

Samir Datta, 2004 (Now at Chennai Mathematical Institute, Chennai)

Michal Koucký, 2003 (Now at the Czech Academy of Sciences)

Martin Strauss, 1995 (Now at U. Michigan)

Vivek Gore, 1993 (Now Vice President for Technology at CNSI.)

POSTDOCTORAL FELLOWS I served as mentor for the following DIMACS postdoctoral fellows:

Neeraj Kayal (2007-8) (Now at Microsoft Research, Bangalore)

Andrej Bogdanov (2006-7) (Now at Tsinghua University, Beijing)

Venkatesh Srinivasan (2001-2) (Now at U. Victoria)

Dieter van Melkebeek (1999-2000) (Now at U. Wisconsin)

Jeremy Avigad (1995-6) (Now at Carnegie-Mellon University)

Maria-Luisa Bonet (1995-6) (Now at Univ. Politecnica Cat., Barcelona)

Kousha Etessami (1995-6) (Now at U. Edinburgh)

Thomas Wilke (1995-6) (Now at U. Kiel)

COMMITTEES:
Departmental Committees:

2006-present: Department Chair

2005-present, 1998-2003 and 1994-1996: member, Departmental Executive Committee

1991-present: Departmental AAUP Representative

2006, 1999-2003: Director, Departmental Graduate Program

2005-2006: Departmental Publicity and Awards Committee (chair)

2005-2006, and 1991-1999: member, Undergraduate Advising Committee; (chair 1994-1999).

2005: Workload Assignment Committee

2004-2005: Ad-Hoc Departmental Workload Planning Committee (chair)

2004, 2002, 2001, 1998 and 1994: Departmental Peer Evaluation Committee

2002: Committee to redesign 205, 206, 344 sequence.

2000-2001, 1998-1999 and 1991-1992: member, Departmental Hiring Committee; (chair 1998-1999).

2000-2001: Departmental Elections Committee

1987-2001: member, Undergraduate Curriculum Committee.

1999: Chair, Technology Transfer & Conflict of Interest Committee

1994: Departmental Ad Hoc Committee on Revising the Qualifying Exams

1989-1991: chair, Departmental Colloquium Committee.

1988-1991: member, Departmental Graduate Admissions Committee.

University Committees:

2008-present member: Advisory Committee on Foreign Languages

2007-present Faculty Mentor for SAS Honors Program

2006-present member, Rutgers Speakers Bureau

2005-2009 and 1994-1997: University Senator for Rutgers College

2005-2009: member, Senate Instruction, Curricula, and Advising Committee.

2005-2007 Faculty Mentor for Rutgers College Honors Program

2004-2007: member, Executive Council, Graduate School-New Brunswick.

2005-2006 and 1998-2003: member, DIMACS Council

2005-2006: FAS Advisory Committee on Appointments and Promotions

2005-2006: member, Subcommittee on Terminal Master's Programs (for the Executive Council, Graduate School-New Brunswick).

1999-2001: Physical and Mathematical Sciences Area Committee (Graduate School)

1999-2000: Alternate, Appointments and Promotions Committee (Faculty of Arts and Sciences)

1999-2000: Grievance Committee member

1994-1997: member, Senate Educational Policy Committee

1996: member, DIMACS Strategic Planning Committee

1994-1996: member, DIMACS Executive Committee

1993-1996: chair, DIMACS Workshop Committee

1993-1994: member, DIMACS Education Steering Committee

1990-1991: member, New Brunswick Faculty Council Library Committee.

Student Committees:

Exam Committees for Jim Llewellyn, Ron van der Meyden, Fritz Henglein, Tony Bonner, Vivek Gore (Chair), Ileana Streinu (Chair), Jia Jiao, Samir Datta (chair), Murali Rangarajan, Michal Koucký (chair), Aniruddha Bohra, Fancong Zeng, Detlef Ronneburger (chair), Nick Weininger, Sambuddha Roy (chair), and Vivek Pathak.

Thesis Committees at Rutgers for Jiazhen Cai, Fritz Henglein, Tony Bonner, Ron van der Meyden, Hava Siegelmann, Shiyu Zhou, Ramkrishna Chatterjee, Srikrishnan Divakaran, and Navin Goyal.

Thesis Committees for Carme Álvarez (Universitat Politècnica de Catalunya, Barcelona), Sanjeev Khadilkar (Indian Institute of Technology, Kanpur), Hervé Caussinus (Université de Montréal, in French), Francois Lemieux (McGill University), D. Sivakumar (SUNY Buffalo), Huong LêThanh (Université Paris Sud, Orsay, in French), Nicola Galesi (Universitat Politècnica de Catalunya, Barcelona), P. R. Subramanya (Indian Institute of Science, Bangalore), Shuo Sheng (Rutgers ECE), Vladimir Trifonov (University of Texas), Kristoffer Arnsfelt Hansen (Aarhus, Denmark), Sylvain Perifel (Ecole Normale Supérieure de Lyon, in French), and T. C. Vijayaraghavan (Institute for Mathematical Sciences, Chennai).

Habilitationsschrift committees for Gerhard Buntrock (Universität Würzburg, in German), for Rainer Schuler (Universität Ulm, in German), and for Carsten Damm (Universität Trier).

PROFESSIONAL ACTIVITIES:

Member, Editorial Board, ACM Transactions on Computation Theory (2007-present).

Co-editor, Special issue of SIAM Journal on Computing covering the 2007 ACM Symposium on Theory of Computing (2007-present).

Member, Editorial Board, Computational Complexity (2005-present).

Member, Chief Editorial Committee, DIMACS Book Series, American Mathematical Society (2004-present).

Consulting Editor, Chicago Journal of Theoretical Computer Science (1998-present).

Editor, Chicago Journal of Theoretical Computer Science (1994-present).

Scientific Board, Electronic Colloquium on Computational Complexity (ECCC), (1995-present).

Conference Committee, IEEE Computational Complexity Theory Conference (2006-2009, 1995-2001; chair, 1997-2000).

Member, SIGACT Nominating Committee, 2008.

Member of ACM Focus Group on Revitalizing CACM (2007)

Editor, Special issue of Computational Complexity covering the 2004 IEEE Conference on Computational Complexity (2004-2005).

Editor, Computational Complexity Column, Bulletin of the European Association for Theoretical Computer Science (1997-2000).

Editor, Special issue of Journal of Computer and System Science covering the 1995 IEEE Structure in Complexity Theory Conference.

Chair of the program committee, tenth annual IEEE Structure in Complexity Theory Conference (1995).

Co-organizer, 1995-1996 DIMACS Special Year on Logic and Algorithms.

Member of External Review Committees:

Institute of Mathematical Sciences, Chennai, India (2009)

Graduate Program in Computer Science, SUNY Buffalo (2008)

Member of Program Committees:

Computing: The Australasian Theory Symposium (CATS 2009)

Annual International Computing and Combinatorics Conference (COCOON 2008 and 2001)

2nd Annual International Computer Science Symposium in Russia (CSR 2007).

39th ACM Symposium on Theory of Computing (STOC 2007).

12th Workshop on Logic, Language, Information and Computation (WoLLIC 2005).

22nd International Symposium on Theoretical Aspects of Computer Science (STACS 2005).

19th Annual IEEE Conference on Computational Complexity (CCC 2004).

2nd Annual IFIP Conference on Theoretical Computer Science (TCS 2002).

40th Annual IEEE Symposium on Foundations of Computer Science (FOCS 1999)

XVII International Conference of the Chilean Computer Science Society (SCCC 1997)

Fifteenth annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS 1995)

Annual IEEE Structure in Complexity Theory Conference (1989 and 1993)

Workshop (Co-)organizer:

DIMACS-DIMATIA workshop: "Algebraic Methods and Arithmetic Circuits" (1999).

DIMACS workshop: "Special Year on Logic and Algorithms – One Year Later" (1997).

1996 Workshop on Structure and Complexity Theory, Schloß Dagstuhl, Germany.

DIMACS Complexity Day, February 1995.

DIMACS Workshop on Structural Complexity and Cryptography (1990).

Steering Committee, IEEE Structure in Complexity Theory Conference (1994-1995).

REVIEWING ACTIVITIES:

Refereed for the following journals and committees:

ACM Doctoral Dissertation Award committee

Chicago Journal of Theoretical Computer Science

Computational Complexity

Discrete Mathematics

IEEE Transactions on Computers

IEEE Transactions on Information Theory

Information and Computation

Information Processing Letters

International Journal of Foundations of Computer Science

Journal of Artificial Intelligence Research

Journal of Computer and System Sciences

Journal of the ACM

Mathematical Systems Theory

Neural Computation

RAIRO - Theoretical Information and Applications

SIAM Journal on Computing

SIAM Journal on Discrete Mathematics

South African Computer Journal

Theoretical Computer Science.

Theory of Computing Systems

Refereed grant proposals for the National Science Foundation, for the Natural Sciences and Engineering Research Council of Canada, for the Killam Program of the Canada Council, for Fonds pour la Formation de Chercheurs et l'Aide á la Recherche (Quebec), for the Engineering and Physical Sciences Research Council (England), for the Israel Science Foundation, and for CUNY.

Served as outside reviewer for many conferences (STOC, FOCS, STACS, ICALP, CCC, FST&TCS, and many others).

Review of *Parallel RAMs with Owned Global Memory and Deterministic Context-Free Languages*, Computing Reviews 41, 2000, pp. 278–279. Reprinted in SIGACT News 31, December, 2000, p. 27.

Review of *Succinct Representation, Leaf Languages, and Projection Reductions*, Computing Reviews 40, 1999, p. 401.

Review of *Space-efficient deterministic simulation of probabilistic automata*, Computing Reviews 40, 1998, pp. 162–163.

Review of Complexity Theory Retrospective II, SIGACT News 29:1, March, 1998, pp. 2–5.

Review of *The Isomorphism Conjecture Fails Relative to a Random Oracle*, Computing Reviews 37, 1996, p. 532.

Review of Limits to Parallel Computation: P-Completeness Theory, Computing Reviews 37, 1996, p. 335.

Review of Structural Complexity I and Structural Complexity II, Journal of Symbolic Logic 59, December, 1994, pp. 1436–1437.

Review of *Hard Promise Problems and Nonuniform Complexity*, Computing Reviews 35, November, 1994, p. 580.

Review of *Extensions to Barrington's M-program model*, Computing Reviews 35, May, 1994, p. 262.

Review of *Separating the eraser Turing machine classes L_e, NL_e and P_e*, Computing Reviews 33, July 1992, p. 387.

Review of *PP is closed under intersection*, Computing Reviews 32, October 1991, p. 520–521. Reprinted in SIGACT News 23, Winter, 1992, p. 10.

Review of *Inversion in finite fields using logarithmic depth*, Computing Reviews 32, July 1991, p. 374.

Review of *On the decomposability of NC and AC*, Computing Reviews 32, June 1991, p. 316.

Review of *Optimal bounds for decision problems on the CRCW PRAM*, Computing Reviews 31, May 1990, pp. 265–266. Reprinted in SIGACT News 21, Summer, 1990, p. 21.

Review of *On the power of one-way communication*, Computing Reviews 29, December 1988, p. 657.

Review of *Minimal degrees for polynomial reducibilities*, Computing Reviews 28, November 1987, p. 592.

Review of *Minimal coverings for incompletely-specified sequential machines*, Computing Reviews 27, December 1986, pp. 621-622.

SELECTED INVITED LECTURES AND COLLOQUIA:

2009: Invited address, short course on probabilistic computation (four lectures), Summer Workshop on "Algorithmic Information Theory, Computability, and Complexity," organized by the New Zealand Mathematical Research Institute (NZMRI) and the New Zealand Institute of Mathematics and its Applications (NZIMA), Napier, New Zealand, January 4-9.

2008: *Circuit Complexity, Kolmogorov Complexity, and Prospects for Lower Bounds*, Invited address, 10th International Workshop on Descriptional Complexity of Formal Systems (DCFS 2008), Prince Edward Island, July 16-18.

Cracks in the Defenses: Scouting Out Approaches on Circuit Lower Bounds, invited address, 3rd International Computer Science Symposium in Russia (CSR 2008), Moscow, June 7-12.

Chipping Away at P vs NP: How Far Are We from Proving Circuit Size Lower Bounds?, Keynote Lecture, Computing: the Australasian Theory Symposium (CATS 2008), University of Wollongong, Australia, January 22-25.

2007: Tutorial on Derandomization Techniques and Kolmogorov Complexity; series of three lectures, FRG Workshop on Effective Randomness, University of Chicago, Sept. 16, 18, 19.

Reachability Problems: An Update, Invited Lecture, Special Session on Complexity of Algorithms and Proofs, Computability in Europe (CiE 2007), June 18-23.

Arithmetic Circuits, Real Numbers, and the Counting Hierarchy, Invited Plenary Lecture, Conference on Logic, Computability, and Randomness, Buenos Aires, Argentina, January 10-13.

2006: *Some Recent and Not-So-Recent Upper and Lower Bounds in Arithmetic Circuit Complexity*, Invited survey lecture, Workshop on Circuits, Logic, and Games, Schloss Dagstuhl, November 8.

2005: *On the Complexity of Numerical Analysis*, Invited lecture, special session on "Randomness in Computation", at the American Mathematical Society Sectional Meeting, University of Nebraska, Lincoln, Oct 20.

2004: *Algorithmic Randomness and Derandomization*, Atlantic Theory Seminar (ATS), sponsored by Iowa State University and the University of Nebraska, Atlantic, Iowa, November 9.

The Audacity of Computational Complexity Theory, Symposium on Computational Complexity, Honoring Dr. Richard M. Karp, Drexel University, Philadelphia, April 28.

Derandomization and Kolmogorov Complexity, Invited Talk, Special Session on Computational Complexity, Victoria International Conference, Victoria University, Wellington, NZ, February 12.

2003: *Algorithmic Randomness and Derandomization*, series of invited tutorial lectures, 10th Workshop on Logic, Language, Information and Computation (WoLLIC 2003), Ouro Preto, Brazil, July 27-August 1.

2002: *Complexity Classes and Linear Algebra*, invited address (semi-plenary speaker), workshop on Complexity at the Conference of the Society for Foundations of Computational Mathematics (FoCM), Minneapolis, August 12.

2001: *When worlds collide: derandomization, lower bounds, and Kolmogorov complexity*, Keynote address, 21st annual Conference on Foundations of Software Technology and Theoretical Computer Science, Bangalore, India, December 13.

2000: Invited address, short course on complexity theory at the Summer Workshop on "Computability, Complexity, and Computational Algebra," organized by the New Zealand Mathematical Research Institute (University of Wellington), Kaikoura, New Zealand, January 7-14.

1997: *Arithmetic Circuits and Boolean Complexity*, Invited address, 17th International Conference of the Chilean Computer Science Society (SCCC '97), Viña del Mar, Chile, November 11.

1996: *Circuit Complexity before the Dawn of the New Millennium*, Invited address, sixteenth annual Conference on Foundations of Software Technology and Theoretical Computer Science (FST&TCS), Hyderabad, India, December 18.

1991: *On strong separations from AC^0*, Invited address, 8th International Conference on Fundamentals of Computation Theory, Gosen, Germany, September 11.

1990: *Oracles vs Proof techniques that do not relativize*, invited address, SIGAL International Symposium on Algorithms, August 16, Tokyo, Japan.

PUBLICATIONS

REFEREED JOURNAL PUBLICATIONS:

1. *The Complexity of Satisfiability Problems: Refining Schaefer's Theorem* (with Michael Bauland, Neil Immerman, Henning Schnoor, and Heribert Vollmer), J. Computer and System Sciences 65, to appear.

2. *Planar and Grid Graph Reachability Problems* (with David A. Mix Barrington, Tanmoy Chakraborty, Samir Datta and Sambuddha Roy), Theory of Computing Systems, to appear.

3. *On the Complexity of Numerical Analysis*, (with Peter Bürgisser, Johan Kjeldgaard-Pedersen, and Peter Bro Miltersen), Miltersen), SIAM Journal on Computing, 38 (2009) 1987-2006.

4. *Minimizing Disjunctive Normal Form Formulas and AC^0 Circuits Given a Truth Table*, (with Lisa Hellerstein, Paul M. McCabe, Toniann Pitassi, and Michael Saks), SIAM Journal on Computing, 38 (2008) 63-84.

5. *Power from Random Strings* (with Harry Buhrman, Michal Kouckỳ, Dieter van Melkebeek, and Detlef Ronneburger), SIAM Journal on Computing 35 (2006) 1467-1493.

6. *NL-printable sets and Nondeterministic Kolmogorov Complexity*, Theoretical Computer Science 355 (2006) 127–138. (**Special issue** containing selected papers from 10th Workshop on Logic, Language, Information and Computation.)

7. *What Can be Efficiently Reduced to the Kolmogorov-Random Strings?* (with Harry Buhrman and Michal Koucký), Annals of Pure and Applied Logic 138 (2006) 2–19.

8. *The complexity of planarity testing* (with Meena Mahajan), Information and Computation 189 (2004) 117–134.

9. *Complexity of some Arithmetic Problems for Binary Polynomials* (with Anna Bernasconi, Carsten Damm, Joachim von zur Gathen, Michael Saks, and Igor Shparlinski), Computational Complexity 12 (2003) 23–47.

10. *Arithmetic Complexity, Kleene Closure, and Formal Power Series* (with V Arvind and Meena Mahajan), Theory of Computing Systems 36 (2003) 303–328.

11. *Uniform Constant-Depth Threshold Circuits for Division and Iterated Multiplication* (with David A. Mix Barrington and William Hesse), J. Computer and System Sciences 65 (2002) 695–716. (**Special issue** containing selected papers from the 16th IEEE Conference on Computational Complexity.)

12. *Reducing the Complexity of Reductions* (with Manindra Agrawal, Russell Impagliazzo, Toniann Pitassi, and Steven Rudich), Computational Complexity 10 (2001) 117–138.

13. *A Lower Bound for Primality* (with Michael Saks and Igor Shparlinski), J. Computer and System Sciences 62 (2001) 356–366. (**Special issue** containing selected papers from the 14th IEEE Conference on Computational Complexity.)

14. *Characterizing Small Depth and Small Space Classes by Operators of Higher Types* (with Manindra Agrawal, Samir Datta, Heribert Vollmer, and Klaus W. Wagner) Chicago Journal of Theoretical Computer Science (2000) article 2.

15. *Complexity of Finite-Horizon Markov Decision Process Problems* (with Martin Mundhenk, Judy Goldsmith, and Christopher Lusena), J. ACM 47 (2000) 681–720.

16. *Making nondeterminism unambiguous* (with Klaus Reinhardt), SIAM Journal on Computing 29 (2000) 1118–1131.

17. *On TC^0, AC^0, and Arithmetic Circuits* (with Manindra Agrawal and Samir Datta), J. Computer and System Sciences 60 (2000) 395–421. (**Special issue** containing selected papers from the 12th IEEE Conference on Computational Complexity.)

18. *Isolation, Matching, and Counting: Uniform and Nonuniform Upper Bounds* (with Klaus Reinhardt and Shiyu Zhou), J. Computer and System Sciences 59 (1999) 164–181. (**Special issue** containing selected papers from the 13th IEEE Conference on Computational Complexity.)

19. *The complexity of matrix rank and feasible systems of linear equations* (with Robert Beals and Mitsunori Ogihara), Computational Complexity 8 (1999) 99–126.

20. *The permanent requires large uniform threshold circuits*, Chicago Journal of Theoretical Computer Science (1999) article 7.

21. *Reductions in Circuit Complexity: An Isomorphism Theorem and a Gap Theorem* (with Manindra Agrawal and Steven Rudich), J. Computer and System Sciences 57 (1998) 127–143. (**Special issue** containing selected papers from the 11th IEEE Conference on Computational Complexity.)

22. *Non-Commutative Arithmetic Circuits: Depth Reduction and Size Lower Bounds* (with Jia Jiao, Meena Mahajan, and V. Vinay), Theoretical Computer Science 209 (1998) 47–86.

23. *RUSPACE(logn)* $\subseteq$ *DSPACE(log*^{2}*n/loglogn)* (with Klaus-Jörn Lange), Theory of Computing Systems 31 (1998) 539–550. (**Special issue** containing selected papers from the 7th Annual International Symposium on Algorithms and Computation.)

24. *A first-order isomorphism theorem* (with José Balcázar and Neil Immerman), SIAM Journal on Computing 26 (1997) 557–567.

25. *Relationships among PL, #L, and the determinant* (with Mitsunori Ogihara), RAIRO - Theoretical Information and Application 30 (1996) 1–21.

26. *A uniform circuit lower bound for the permanent* (with Vivek Gore), SIAM Journal on Computing 23 (1994) 1026–1049.

27. *Depth reduction for circuits of unbounded fan-in* (with Ulrich Hertrampf), Information and Computation 112 (1994) 217–238.

28. *The complexity of computing maximal word functions* (with Danilo Bruschi and Giovanni Pighizzini), Computational Complexity 3 (1993) 368-391.

29. *Almost-everywhere complexity hierarchies for nondeterministic time* (with Richard Beigel, Ulrich Hertrampf, and Steven Homer), Theoretical Computer Science 115 (1993) 225–242.

30. *Relating equivalence and reducibility to sparse sets* (with Lane Hemachandra, Mitsunori Ogiwara, and Osamu Watanabe), SIAM J. Comput. 21 (1992) 521–539.

31. *Lower bounds for the low hierarchy* (with Lane Hemachandra), J. ACM 39 (1992) 234–251.

32. *Rudimentary reductions revisited* (with Vivek Gore), Information Processing Letters 40 (1991) 89–95.

33. *Limitations of the Upward Separation Technique*, Mathematical Systems Theory 24 (1991) 53–67.

34. *Downward translations of equality* (with Chris Wilson), Theoretical Computer Science 75 (1990) 335–346.

35. *Kolmogorov complexity and degrees of tally sets* (with Osamu Watanabe), Information and Computation 86 (1990) 160–178.

36. *P-uniform circuit complexity*, J. ACM 36 (1989) 912–928.

37. *Some consequences of the existence of pseudorandom generators*, J. Computer and System Sciences 39 (1989) 101–124. (**Special issue** containing selected papers from the 1987 Structure in Complexity Theory Conference.)

38. *P-printable sets* (with Roy Rubinstein), SIAM J. Comp. 17 (1988) 1193–1202.

39. *Isomorphisms and 1-L reductions*, J. Computer and System Sciences 36 (1988) 336–350. (**Special issue** containing selected papers from the 1986 Structure in Complexity Theory Conference.)

40. *Improved lower bounds for the cycle detection problem* (with Maria Klawe), Theoretical Computer Science 36 (1985) pp. 231–237.

41. *On the number of cycles possible in digraphs with large girth*, Discrete Applied Mathematics 10 (1985) pp. 211–225.

REFEREED INVITED CHAPTERS IN BOOKS:

42. *A Status Report on the P versus NP Question*, to appear in **Advances in Computers**, Marvin Zelkowitz, editor.

43. *Computational Complexity Theory*, to appear in **Encyclopedia of Computer Science and Engineering**, Benjamin Wah, editor in chief, Wiley Interscience.

44. *Arithmetic Circuits and Counting Complexity Classes*, in **Complexity of Computations and Proofs**, Jan Krajíček, editor, Quaderni di Matematica Vol. 13, Seconda Università di Napoli, 2004, pp. 33-72.

45. *The Division Breakthroughs*, in "Current Trends in Theoretical Computer Science: The Challenge of the New Century, Vol. 1: Algorithms and Complexity" G. Păun, G. Rozenberg, and A. Salomaa, ed., World Scientific Press, 2004, pp. 147-164.

46. *Complexity Theory* (with Michael Loui and Kenneth Regan), in the **CRC Computer Science Handbook, Second Edition**, ed. Allen B. Tucker, Jr., 2004, CRC Press, pp. 5-1 – 5-30.

47. *Basic Complexity* (with Catherine McCartin), in "Aspects of Complexity", Rod Downey and Denis Hirschfeldt, eds. de Gruyter Series in Logic and Its Applications, Volume 4, 2001, pp. 1–28.

48. *Some pointed questions about asymptotic lower bounds, and news from the isomorphism front*, in "Current Trends in Theoretical Computer Science: Entering the 21st Century" G. Păun, G. Rozenberg, and A. Salomaa, ed., World Scientific Press, 2001, pp. 25–41.

49. Three chapters, *Complexity Classes*, *Reducibility and Completeness*, and *Other Complexity Classes and Measures* (with Michael Loui and Kenneth Regan), in the **CRC Handbook of Algorithms and Theory of Computation**, ed. M. Atallah, 1999, Chapters 27–29, CRC Press.

50. *On strong separations from AC^0* (with Vivek Gore), in "Advances in Computational Complexity Theory," Jin-Yi Cai, ed., DIMACS Series in Discrete Mathematics and Theoretical Computer Science, Volume 13, AMS Press, 1993, pp. 21–37.

51. *Counting hierarchies: polynomial time and constant depth circuits* (with Klaus W. Wagner), in "Current Trends in Theoretical Computer Science," G. Rozenberg and A. Salomaa, ed., World Scientific Series in Computer Science, Vol. 40, World Scientific Press, 1993, pp. 469–483.

52. *Applications of time-bounded Kolmogorov complexity in complexity theory*, in "Kolmogorov Complexity and Computational Complexity," Osamu Watanabe, editor, EATCS Monograph Series, Springer-Verlag, 1992, pp. 4–22. (A preliminary version of this work appeared in Proc. AAAI Spring Symposium on the Theory and Application of Minimal-Length Encoding).

CONFERENCE PAPERS:

53. *Amplifying Lower Bounds by Means of Self-Reducibility*, (with Michal Koucký), Proc. 23rd Annual IEEE Conference on Computational Complexity, 2008, pp. 31–40.

54. *Minimizing DNF Formulas and AC^0 Circuits Given a Truth Table*, (with Lisa Hellerstein, Paul M. McCabe, Toniann Pitassi, and Michael Saks), Proc. 21st Annual IEEE Conference on Computational Complexity, 2006, pp. 237–251. (An expanded version of this work appeared as [4].)

55. *On the Complexity of Numerical Analysis*, (with Peter Bürgisser, Johan Kjeldgaard-Pedersen, and Peter Bro Miltersen), Proc. 21st Annual IEEE Conference on Computational Complexity, 2006, pp. 331–339. (An expanded version of this work appeared as [3].)

56. *Grid Graph Reachability Problems*, (with David A. Mix Barrington, Tanmoy Chakraborty, Samir Datta and Sambuddha Roy), Proc. 21st Annual IEEE Conference on Computational Complexity, 2006, pp. 299–313. (This material was incorporated into the paper [2].)

57. *The Directed Planar Reachability Problem*, (with Samir Datta and Sambuddha Roy), in Proc. 25th Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FST&TCS '05), Lecture Notes in Computer Science 3821, pp. 238–249. (This material was incorporated into the paper [2].)

58. *The Complexity of Satisfiability Problems: Refining Schaefer's Theorem* (with Michael Bauland, Neil Immerman, Henning Schnoor, and Heribert Vollmer), in Proc. 30th International Symposium on Mathematical Foundations of Computer Science (MFCS), 2005, Lecture Notes in Computer Science 3618, pp. 71–82. (An expanded version of this work appeared as [1].)

59. *Topology inside* NC^1, (with Samir Datta and Sambuddha Roy), in Proc. 20th Annual IEEE Conference on Computational Complexity, 2005, pp. 298–307.

60. *What Can be Efficiently Reduced to the K-Random Strings?* (with Harry Buhrman and Michal Koucký), Proc. 21st Symposium on Theoretical Aspects of Computer Science (STACS), 2004, Lecture Notes in Computer Science 2996, pp. 584-595. (An expanded version of this work appeared as [7].)

61. *Derandomization and Distinguishing Complexity*, (with Michal Koucký, Detlef Ronneburger, and Sambuddha Roy), Proc. 18th Annual IEEE Conference on Computational Complexity, 2003, pp. 209-220.

62. *A Note on the Representational Incompatibility of Function Approximation and Factored Dynamics* (with Sanjeev Arora, Michael Kearns, Cristopher Moore, and Alexander Russell), in Proc. 16th Annual Conference on Neural Information Processing Systems (NIPS 2002), MIT Press, 2003, pp. 431–437.

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