Curriculum Vitae

Xizhong ZHENG, PhD

Professor
Department of Computer Science and Mathematics
Arcadia University
Glenside, PA 19038
email: zhengx@arcadia.edu
URL: http://gargoyle.arcadia.edu/mathcs/zhengx/

Office: Boyer 112A
Phone: (267) 620-4803 (office)

1   Education

February 1978–January 1982

Undergraduate Study, Major Mathematics.
Jiangsu University, Zhenjiang, China.
Bachelor of Science Degree in Mathematics (January 1982)

February 1982–January 1985

Graduate Study for Masters Degree, Major Mathematical Logic,
Nanjing University, Nanjing, China.
Master of Science Degree in Mathematics (December 1984).
Thesis: *Elementary Systems of Concatenation, Elementary Arithmetics and Protosyntax.*
Advisor: Professor Mo Shaokui.

February 1985–December 1987

Graduate Study for Ph.D Degree, Major Mathematics,
Nanjing University, Nanjing, China.
PhD Degree in Mathematics (December 1978)
Thesis: *The Rhombus Classes of Degrees of Unsolvability*
Advisor: Professor Mo Shaokui.

February 1996–November 1998

Graduate Study for Doctoral Degree, Major Computer Science
University of Hagen, Germany.
Dr. rer. nat. (PhD) Degree in Computer Science.
Thesis: *Weak Computability and Semi-Continuity in Analysis.*
Advisor: Professor Klaus Weihrauch.

April 2000–February 2005

Dr. rer. nat. habil. (Habilitation, a German academic degree after PhD)
Major Computer Science
Brandenburg University of Technology Cottbus (BTU Cottbus)), Germany.
Thesis: *Computability Theory of Real Numbers.*

2   Professional Experience

January 1988–November 1992

Lecturer of Mathematics,
Department of Mathematics, Nanjing University, Nanjing, China.

December 1992–September 1993
Associate Professor of Mathematics,
Department of Mathematics, Nanjing University, Nanjing, China.

October 1993–September 1994
Visiting Scholar, (Scholarship of State Education Commission of China)
Department of Mathematics, Heidelberg University, Germany.

October 1994–December 1996
Wissenschaftliche Hilfskraft (Research Assistant),
Department of Computer Science, University of Hagen, Germany.

January 1997–April 2000
Wissenschaftlicher Mitarbeiter (Research Associate),
Department of Computer Science, University of Hagen, Germany.

May 2000–February 2005
Wissenschaftlicher Assistent ($\approx$ Lecturer),
Department of Computer Science, BTU Cottbus, Germany.

March 2005–August 2007
Privatdozent ($\approx$ Senior Lecturer),
Department of Computer Science, BTU Cottbus, Germany.

September 2007–August 2008
Visiting Assistant Professor,
Department of Mathematics, University of Cincinnati, Cincinnati, Ohio.

September 2008–August 2010
Assistant Professor,
Department of Computer Science and Mathematics, Arcadia University

September 2010–August 2013
Associate Professor,
Department of Computer Science and Mathematics, Arcadia University

Since September 2013
Full Professor
Department of Computer Science and Mathematics, Arcadia University

3 Professional Activities

3.1 Research Projects (9)

1987–1989 "Effectivity, Forcing and Its Application in Computer Science," NSFC (Chinese National Nature Science Foundation), Project Leader Mo Shaoqui. I served as a principal research member (equivalent to Co-PI).

1987–1989 "Mathematical Logic and Its Application in Computer Science," Supported by Foundation of State Education Commission of China. Project Leader Mo Shaoqui. I served as a principal research member.

1991–1993 "Reducibility, Complexity and Their Applications in Artificial Intelligence," Supported by Chinese National Natural Science Foundation of China. I was the project leader (equivalent to PI).

1991–1993 "Mathematical Logic, Computability Theory, Model Theory and Their Applications in Computer Science," Supported by The National Natural Science Foundation of China. Project Leader Mo Shaoqui. I served as a principal research member.

1993–1994 "Effective Analysis and Computing Model," Supported by The National High Technology Research and Development Program of China (Project 863). Project Leader is Ding Decheng. I served as a principal research member.

1996–1998 "Berechenbarkeit und Komplexität in der Analysis," (Computability and Complexity in Analysis). Supported by German Natural Science Foundation (Deutsche Forschungsgemeinschaft, DFG). Project Leader Klaus Weihrauch, I served as a principal research member.

2004–2007 "Algorithmic Foundation of Numerical Computation, Computability and Computational Complexity," Jointly supported by DFG (Deutsche Forschungsgemeinschaft) and NSFC (National Natural Science Foundation of China).
This project was initiated by Klaus Weirauch and me. To prepare, we first organized an international workshop for Computability and Complexity in Analysis in Nanjing University in September, 2003. During the workshop, we developed a proposal for the joint research project which includes four German and several Chinese universities. I was responsible for the coordination between the two teams.

2009-2012 "Computability and Complexity in Analysis, Towards a Sound Foundation for Scientific Computation". This is a successor of the above project. The German team has been extended to seven universities and is led by Dieter Spreen. The Chinese team has grown to nine Universities headed by Deching Ding.

2010-2013 "Computability and Complexity in Non-discrete Systems". Supported by Chinese NSF. I am a Co-PI.

3.2 Invited Colloquium and Seminar Talks (35)

1. *Nov. 15, 1993.* "The hierarchies of subrecursive functions",
   SEKI-Forum, Department of Computer Science, Universität Karlsruhe, Germany.

2. *Feb. 16, 1994.* "n^k-random sets are weakly complete for exponential time".
   Workshop on Structure and Complexity, Schloss Dagstuhl - Leibniz Center for Informatics, Germany.

3. *June 6, 1995.* "Weak p-randomness".
   Department of Mathematics, Universität Heidelberg, Germany.

4. *Apr. 22, 1997.* "Computability on continuous, lower semi-continuous and upper semi-continuous real functions". *Workshop on Computability and Complexity in Analysis*, Schloss Dagstuhl - Leibniz Center for Informatics, Germany.

5. *May 25, 1999.* "Some topics about computability in analysis".
   Department of Mathematics, Universität Heidelberg, Germany.

6. *July 7, 1999.* "Computability in analysis",
   Department of Computer Science, Kyushu University, Japan.

7. *July 21, 1999.* "Some topics about computability in analysis".
   Department of Mathematics, Kyoto Sangyo University, Japan.

8. *July 23, 1999.* "Weak computability of real numbers".
   School of Information Science, Japan Advanced Institute of Science and Technology, Japan.

9. *Nov. 17, 1999.* "The set of weakly computable real numbers is not closed under computable real functions". *Workshop on Computability and Complexity in Analysis.*
   Schloss Dagstuhl - Leibniz Center for Informatics, Germany.

10. *Nov. 15, 2001.* "Beyond computable real numbers". *Workshop on Computability and Complexity in Analysis.* Schloss Dagstuhl - Leibniz Center for Informatics, Germany.

11. *Sept. 30, 2003.* "Effective analysis and applications",
    School of Computer Science, Jiangsu University, China.

12. *Sept. 25, 2003.* "Various computability of real numbers",
    Department of Mathematics, Nanjing University, China.

13. *Sept. 3, 2005.* "Introduction to Computability and Complexity in Analysis",
    School of Computer Science, Jiangsu University, China.

14. *Sept. 7, 2005.* "Computability of Real Numbers",
    Department of Mathematics, Nanjing University, China.

15. *Sept. 20, 2005.* "Effective Hierarchy of Real Numbers",
    Institute for Logic and Cognition, Sun Yat-Sen University, China.

16. *Feb. 9, 2006.* "A Computability Theory of Real Numbers",
    Department of Computer Science, Heidelberg University, Germany.

17. *July 3, 2006.* "A computability theory of real numbers".
    Computability in Europe 2006, Logical Approaches to Computational Barriers, Swansea, Wales.

18. *July 21, 2007.* "An Introduction to Computability Theory of Real Numbers",
    Department of Mathematics, Brock University, Canada.

19. *Oct. 12, 2007.* "A Computability Theory of Real Numbers"
    Logic and Foundations of Mathematics Seminar, Department of Computer Science and Department of Mathematical Science, University of Cincinnati.

20. *Oct. 26, 2007.* "On the Weakly Computable Real Numbers".
    Logic and Foundations of Mathematics Seminar, Department of Computer Science and Department of Mathematical Science, University of Cincinnati.

21. *Nov. 2, 2007.* "Randomness of Weakly Computable Real Numbers"
    Logic and Foundations of Mathematics Seminar, Department of Computer Science and

Department of Mathematical Science, University of Cincinnati.

22. *Feb. 22, 2008.* "Weakly Computability and Randomness of Real Numbers",
Department of Mathematics, Lamar University, Texas.

23. *Aug. 22, 2008.* "A computability theory of real numbers".
Fifth International Conference on Computability and Complexity in Analysis, Hagen, Germany.

24. *June 23, 2009.* "Computability and Complexity in Analysis",
Department of Computer Science, Peking University. China.

25. *July 10, 2009.* "Computability of the Solution Operator of Partial Differential Equations". School of Science, Jiangsu University, China.

26. *June 8, 2010.* "Introduction to Computability and Complexity in Analysis".
Department of Computer Science, Donghua University, Shanghai, China.

27. *June 9, 2010.* "Introduction to Computability and Complexity in Analysis".
Department of Mathematics, East China Normal University, Shanghai, China.

28. *June 14, 2010.* "Different Approaches to the Gödel's Incompleteness Theorem"
School of Science, Jiangsu Unversity, Zhenjiang, China.

29. *July 15, 2010.* "On the computability of rectifiable simple curves".
Department of Computer Science, Heidelberg University, Germany.

30. *July 5, 2011.* "On the forced retracing of computable simple curves".
Department of Mathematics, Nanjing University, China.

31. *July 10, 2012.* "On the Hierarchy of Forced Retracing Curves".
School of Science, Jiangsu University, China.

32. *April 27-28, 2013* "On the Definition of Computable Curves".
AMS Special Session on Computability and Complexity in Discrete and Continuous Worlds,
Iowa State University, Ames, IA.

33. *July 29, 2014* "On the Computable Curves".
ADepartment of Computer Science, Heidelberg University, Germany.

34. *June 14, 2015* "Some Mathematical Problems in Computer Science".
School of Science, Jiangsu University, China.

35. *August 9, 2017* "On Computability and Reducibility of Approximable Real Numbers".
Hiddensee, Greifswald University, Germany.

3.3   Memberships (5)

- ACM (Association for Computing Machinery).

- AMS (American Mathematical Society).

- EATCS (European Association for Theoretical Computer Science).

- CiE (Association of Computability in Europe).

- DHV (Deutscher Hochschulverband).

4 Publications

4.1 Monograph (1)

A1. X. Zheng, *Effective Hierarchy of Real Numbers*, Shaker Verlag, Aachen, 2007 (ISBN 978-3-8322-6343-0).

4.2 Research Papers in Scientific Journal (45)

B45 . X. Zheng, D. Abdul-Malak and M. Gillespie. On the Forced Retracing Computable Curves. *Studies in Logic*, Vol. 5 (2012), No. 5, 1–10.

B44 . X. Zheng and R. Rettinger. Point-Separable Classes of Simple Computable Planar Curves. *Logical Methods in Computer Science.* Vol.8(3:15, 2012), 1-19.

B43 . X. Zheng. Classification of computably approximable real numbers. *Theory of Computing Systems* Vol. 43(2008), No. 3-4, 603-624.

B42 . X. Zheng. A hierarchy of computably enumerable reals. *Fundamenta Informaticae*, Vol. 83 (2008), 219 - 230.

B41 . X. Zheng. On the hierarchies of Δ_2^0-real numbers. *Theoretical Informatics and Application*, Vol. 41 (2007), no. 1, 3–25.

B40 . Q. Chen, K. Su and X. Zheng. Primitive recursive real numbers. *Mathematical Logic Quarterly,* Vol. 53(2007), No. 4/5, 345 – 360.

B39 . R. Rettinger and X. Zheng, A hierarchy of Turing degrees for divergence bounded computable real numbers, *Journal of Complexity,* Vol. 22(2006), No. 6, 818 – 826.

B38 . K. Su, Q. Chen, A. Sattar, W. Yue, G. Lv and X. Zheng. Verification of Authentication Protocols for Epistemic Goals via SAT Compilation, *Journal of Computer Science and Technology*, 21(2006), No. 6, 932 – 943, Springer-Verlag.

B37 . K. Su, W. Yue, Q. Chen and X. Zheng. Instantiation space: a new model for security protocol logic, *Chinese Journal of Computers*, 29(2006) No.9, 1657 – 1665.

B36 . X. Zheng, D. Lu and K. Bao. Divergence bounded computable real numbers, *Theoretical Computer Science*, 351(2006), 27 - 38.

B35 . X. Zheng, R. Rettinger and R. Gengler. Closure properties of real number classes under CBV functions. *Theory of Computing Systems*, 38(2005), 701 - 729.

B34 . X. Zheng and R. Rettinger. Effective Jordan decomposition. *Theory of Computing Systems*, 38(2005), No. 2, 189 - 209.

B33 . X. Zheng, R. Rettinger, and G. Barmpalias. *h*-Monotonically computable real numbers, *Mathematical Logic Quarterly,* 51(2005) No. 2, 157-170.

B32 . X. Zheng and R. Rettinger. Weak computability and representation of real numbers. *Mathematical Logic Quarterly*, 50(2004) No.4/5, 431-442.

B31 . R. Downey, G. Wu and X. Zheng. Degrees of d.c.e. reals. *Mathematical Logic Quarterly*, 50(2004) No.4/5, 345-350.

B30 . R. Rettinger and X. Zheng. On the hierarchy and extension of monotonically computable real numbers. *Journal of Complexity*, 19(2003) 672-691.

B29 . X. Zheng. On the Turing degrees of weakly computable real numbers. *Journal of Logic and Computation*, 13 (2003), no. 2, 159–176.

B28 . X. Zheng. Recursive approximability of real numbers. *Mathematical Logic Quarterly,* 48 (2002), Suppl. 1, 131–156.

B27 . R. Rettinger, X. Zheng, R. Gengler and B. von Braunmühl. Monotonically computable real numbers. *Mathematical Logic Quarterly*, 48(2002), no 3, 459–479.

B26 . X. Zheng. Closure properties on real numbers under limits and computable operators. *Theoretical Computer Science*, 284 (2002), No. 2, 499–518.

B25 . X. Zheng and K. Weihrauch. The arithmetical hierarchy of real numbers. *Mathematical Logic Quarterly*, 47(2001), no.1, 51–65.

B24 . K. Ambos-Spies, K. Weihrauch and X. Zheng. Weakly computable real numbers. *Journal of Complexity*, 16(2000), 678-690.

B23 . K. Weihrauch and X. Zheng. Computability on continuous, lower semi-continuous and upper semi-continuous real functions. *Theoretical Comput Science*, 234 (2000), no. 1-2, 109–133.

B22 . X. Zheng, V. Brattka and K. Weihrauch. Approaches to effective semi-continuity of real functions. *Mathematical Logic Quarterly*, 45(1999), no. 4, 481–496.

B21 . K. Weihrauch and X. Zheng. Effectiveness of the global modulus of continuity on metric spaces. *Theoretical Computer Science*, 219(1999), 439–450.

B20 . K. Ambos-Spies, S. Terwijn and X. Zheng. Resource bounded randomness and weakly complete problems. *Theoretical Computer Science*, 172(1997) no.1-2, 195–207.

B19 . X. Gu and X. Zheng. The reduction of double recursion, *J. Nanjing Univ., Math. Biquart.*, 11(1994) no. 1, 56–69 (in Chinese).

B18 . X. Zheng. On the splitting of p-m degrees, *J. Software*, 5(1994) no.4, (in Chinese).

B17 . X. Zheng and L. Qian. An Extension of Grzegorczyk's Hierarchy *J. Software*, 5(1994) no.3, 55–64 (in Chinese).

B16 . X. Zheng. The rhombus classes of degrees of unsolvability (I), the jump properties, *Arch. Math. Logic.* 3(1994) no.1 1–12.

B15 . X. Zheng. The splitting of polynomial time degrees by minimal pairs. *Acta Math. Sinica* 37 (1994), no. 2, 155–159. (Chinese).

B14 . X. Zheng, D. Ding and Z. Sun. On the definition of degrees of unsolvability for real numbers, *Chinese Sci. Bull.*, 38(1993) no.3, 172–175. (in Chinese).

B13 . X. Zheng. Double recursive functions and their hierarchy, *J. Math. Res. Exp.*, 13(1993) no.2, 303–308. (in Chinese).

B12 . X. Zheng. A hierarchy of double recursive functions, *J. Nanjing Univ., Math. Biquart.*, 10(1993) no.1, 39–45. (in Chinese).

B11 . X. Zheng. On the maximality of some pairs of polynomial time degrees, *Notre Dame J. Formal Logic*, 34(1993) no.1, 29-35.

B10 . D. Lu and X. Zheng. On the ninth Grzegorczyk's problem, *J. Jiangsu Polytechnic Univ.*, 13(1992) no.3, 94–101. (in Chinese).

B9 . L. Qian and X. Zheng. The lattice embedding properties of the quasi-contiguous degrees, *Chinese Sci. Bull.*, 37(1992)no.23, 2200–2202. (in Chinese).

B8 . X. Zheng and L. Qian. The hierarchy and Grzegorczyk's problem of multiple recursive functions. *Chinese Sci. Bull.*, 37(1992) no.15, 1319–1320.

B7 . X. Zheng. Combining the splitting and branching of polynomial time degrees, *J. Nanjing Univ., Math. Biquart.* 9(1992), no.2, 158–162 (in Chinese).

B6 . X. Zheng. There is no maximal minimal pair of p-m degrees, *J. Nanjing Univ., Math. Biquart.*, 9(1992) no.1, 18–22 (in Chinese).

B5 . X. Zheng. On the minimal covers for sets of degrees of unsolvability, *Chinese Ann. Math.*, 13A(1992) no.6, 728–733. (in Chinese).

B4 . X. Zheng. $P =?NP$ problem and polynomial time degrees, *J. Nanjing Univ., Math. Biquart.*, 8 (1991) no.2 187–192 (in Chinese).

B3 . X. Zheng. Immunity and simplicity of partial functions, *J. Nanjing Univ., Math. Biquart.*, 8(1991) no.1, 52–55.

B2 . X. Zheng. Elementary system of concatenation, elementary arithmetic and protosyntax, *Chinese Quart. J. Math.*, 6(1991) no.2, 12–30.

B1 . X. Zheng. The rhombus classes of degrees of unsolvability (II), the jump classes and chain properties, *J. Nanjing Univ., Math. Biquart.*, 7(1990) no.1, 13–25.

4.3   Refereed Conference Papers (43)

C43 . X. Zheng. On the Computability of Simple Planar Curves, *Symposium on Modern Developments in Computability Theory and its Applications 2012*, September 17–21, Guangzhou, China

C42 . D. Abdul-Malak, M. Gillespie and X. Zheng. A Hierarchy of the Forced Retracing Computable Curves. *CCA 2012*, June 24-27, Cambridge, UK.

C41 . M. Bauer and X. Zheng. On the weak computability of continuous real functions. *CCA 2010*, June 21-25, Zhenjiang, China, EPTCS, Vol. 24, 29–40.

C40 . R. Rettinger and X. Zheng. Points on Computable Curves of Computable Lengths. *MFCS 2009*, August 24–28, Bratislava, Slovakia, LNCS Vol. 5734, 736-743. Springer.

C39 . R. Rettinger and X. Zheng. On the computability of the rectifiable simple curves. CCA 2009, August 18-22, Ljubljana, Slovenia, Informatik Berichte 353-7/2009, pp243–253 University of Hagen.

C38 . X. Zheng. A computability theory of real numbers CCA'08, August 21-24, Hagen, Germany 2008

C37 . X. Zheng. Bounded computable enumerability and hierarchy of computably enumerable reals, *COCOON 2007*, July 16–19, Banff, Alberta, Canada, LNCS 4598, 327–337. Springer.

C36 . Y. Fan, D. Ding and X. Zheng. Totally d-c.e. Real Numbers, *CiE 2007*, June 18–23, Siena, Italy.

C35 . X. Zheng. Finitely bounded effective computability, *CCA'07*, June 16-18, 2007, Siena, Italy, Electr. Notes Theor. Comput. Sci. 202: 255-265 (2008).

C34 . X. Zheng. Classification of the computable approximations. *CCA 2006*, Florida, USA, *ENTCS* 167(2007), 325–344, Elsevier.

C33 . Q. Chen, K. Su and X. Zheng. Primitive recursiveness of real numbers under different representations, *CCA 2006*, November 1–5, Gainesville, Florida, USA, *ENTCS* 167(2007), 303–304, Elsevier.

C32 . K. Su, Q. Chen, X. Zheng and W. Yue. Reasoning about knowledge by SAT solving, *CIS 2006*, pp536–539, November 3–6, Guangzhou China, IEEE Press.

C31 . X. Zheng. A computability theory of real numbers. *CiE 2006*, 30 June - 5 July, Swansea. LNCS 3988, pp 584 -594. Springer.

C30 . R. Rettinger and X. Zheng. A hierarchy of Turing degrees of divergence bounded computable real numbers. *CCA 2005*, August 25-29, Kyoto, Japan.

C29 . R. Rettinger and X. Zheng. Solovay reducibility on d-c.e. real numbers, *COCOON 2005*, August 16-19, 2005, Kunming, China. LNCS 3595, pp359-368, Springer.

C28 . R. Rettinger and X. Zheng. On the Turing degrees of divergence bounded computable reals, *CiE 2005*, New Computational Paradigms Amsterdam, June 8-12, 2005, LNCS 3526, pp418-428, Springer.

C27 . X. Zheng. On the hierarchy of Δ_2^0-real numbers, *RNC'6*, International Conference on Real Numbers and Computers, Schloss Dagstuhl, Germany, November 15-17, 2004.

C26 . X. Zheng and R. Rettinger. On the Turing degree of divergence bounded computable reals. *CCA 2004*, August 16-20, 2004, Lutherstadt Wittenberg, Germany.

C25 . X. Zheng and R. Rettinger On the extensions of Solovay Reducibility. *COCOON 2004*, August 17-20, 2004, Jeju Island, Korea, LNCS 3106, Springer 2004.

C24 . X. Zheng, R. Rettinger, and R. Gengler. Ershov's hierarchy of real numbers. *MFCS 2003*, August 25 - 29, 2003, Bratislava Slovak Republic, LNCS 2747, 681-690, Springer 2003.

C23 . X. Zheng and R. Rettinger. h-Monotonically computable real numbers. *CCA 2003*, August 28 - 30. 2003, Cincinnati, USA. 375 - 388.

C22 . X. Zheng. On the divergence bounded computable real numbers. *COCOON 2003*, July 25-28, 2003, Big Sky, MT, USA, LNCS 2697, 102-111, Springer 2003.

C21 . X. Zheng, and G. Barmpalias. On the monotonic computability of semi-computable real numbers. *DMTCS 2003*, July 7-12, 2003, Dijon, LNCS 2731, 290-300. Springer 2003.

C20 . X. Zheng, R. Rettinger and B. von Braunmühl. On the effective Jordan decomposability. *STACS 2003*, Feb. 27 - March 1, 2003, Berlin, LNCS 2607, 167-178. Springer 2003.

C19 . X. Zheng, R. Rettinger and B. von Braunmühl. Effectively absolute continuity and effective Jordan decomposability. *ENTCS* 66(2002) no. 1, CCA'02, July 12–13, Malaga, Spain.

C18 . R. Rettinger, X. Zheng and B. von Braunmühl. Computable real functions of bounded variation and semi-computable real numbers. *COCOON'02*, Aug. 15-17, Singapore, LNCS 2387, 47–56. Springer 2002.

C17 . R. Rettinger and X. Zheng. Hierarchy of the monotonically computable real numbers. *MFCS'01* Aug. 27–31, 2001, Marianske Lazne, Czech Rep. LNCS 2136, 633–644, Springer 2001.

C16 . R. Rettinger, X. Zheng, R. Gengler and B. von Braunmühl. Monotonically computable real numbers. *DMTCS'01*, Constanta, Romania, 2-6 July 2001, DMTCS Series, Vol. 17, 187–201, Springer, 2001.

C15 . R. Rettinger, X. Zheng, R. Gengler and B. von Braunmühl. Weakly computable real numbers and total computable real functions. *COCOON'01*, August 2001, Guilin, China. LNCS 2108. 586–595, Springer 2001.

C14 . X. Zheng. Closure properties on real numbers under limits and computable operators. in *COCOON'00*, Sydney, July 26-28, 2000. LNCS 1858, 170–179, Springer 2000.

C13 . X. Zheng and K. Weihrauch. The arithmetical hierarchy of real numbers. *MFCS'99*, Szklarska Poreba, Poland. Sep. 6–10, 1999, LNCS 1672, 23–33, Springer 1999.

C12 . X. Zheng. Binary enumerability of real numbers. in *COCOON'99*, Tokyo, Japan. July, 26–28 1999, LNCS 1627, 300–309, Springer 1999.

C11 . K. Weihrauch and X. Zheng. A finite hierarchy of the recursively enumerable real numbers, *MFCS'98*, Brno, Czech, Aug. 1998, LNCS 1450, 798–806, Springer 1998.

C10 . V. Brattka, K. Weihrauch and X. Zheng. Approaches to effective semi computability of real functions. *COCOON'98*, Taiwan, China, Aug. 1998, LNCS, 1449, 184–193, Springer 1998.

C9 . K. Weihrauch and X. Zheng. Effectiveness of the global modulus of continuity on metric spaces. *CTCS'97*, Santa Margherita Ligure, Italy, September 1997. LNCS 1290, 210–219.

C8 . K. Weihrauch and X. Zheng. Computability on continuous, lower semi-continuous and upper semi-continuous real functions. *COCOON'97*, Shanghai, China, August 1997. LNCS 1276, 166–175.

C7 . K. Ambos-Spies, E. Mayordomo and X. Zheng. A comparison of weak completeness notions. In *Computational Complexity'96*, May 24-27, 1996, Philadelphia, Pennsylvania, USA, 1996, 171-178, IEEE Computer Society Press.

C6 . K. Ambos-Spies, E. Mayordomo, Y. Wang and X. Zheng. Resource-bounded balanced genericity, stochasticity and weak randomness. *STACS'96*, Feb. 1996, LNCS 1046, 63–74, Springer 1996.

C5 . K. Ambos-Spies, S. Terwijn and X. Zheng. Resource bounded randomness and weakly complete problems. *ISAAC'94*, Beijing, LNCS 834, 389–377, Springer 1994.

C4 . X. Zheng and L. Qian. An extension of Grzegorczyk's hierarchy, *Chinese Conference of Theoret. Comput. Sci.*, Langzhou, 1991.8, 32–46,

C3 . X. Zheng. Hierarchy of a class of subrecursive functions, *Chinese Conference of Theoret. Comput. Sci.*, Langzhou, August 1991. 77–82. (in Chinese).

C2 . X. Zheng. Primitive recursive reducibility, *Selected Papers on BCK, BCI-algebras and Computer Logic* Shen Baiying ed., 173–178, Shanghai Jiaotong University Press, 1991. (in Chinese)

C1 . X. Zheng. Generating bases and jump classes, in *Proc. of the Chinese Mathematical Logic Conference, Yangzhou, October 1989*, pp119-121. (in Chinese)