CURRICULUM VITAE

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Name:	RAO Hui
Sex:	Male
Date and Place of Birth:	September 26, 1969 Hubei
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Present Position:	Associate professor of Tsinghua University.

EDUCATION

1985-1989:	B.S. (Probability Theory) Sichuan University, Chengdu, China
1989-1992:	M.S. (Fractal Geometry) Wuhan University, Wuhan, China
1992-1995:	Ph.D. (Fractal Geometry) Wuhan University

ACADEMIC EXPERIENCES

1995.11-1997.07:	Postdoc of Nanjing University, Nanjing, China.
1997.11-1998.06:	Posdoc of the Chinese University of Hong Kong, Hong Kong, China.

1998.07-2001.02:	Associated Professor of Wuhan University.
2001.02-2003.02:	Postdoc of Japan Science Promotion Society.
2003.03-2003.09:	Visitor of Laboratory of Informatics, Robotics and Microelectronics in Montpellier, France.
2004.02-2004.08:	Visitor of Greifswald University, Germany.
2004.08—-:	Associated Professor of Tsinghua University.

RESEARCH INTERESTS

Dimensions and measure. I started my research by working on dimensions and measures of fractal sets, particularly on self-similar sets and self-similar measures with overlapping structures. Under a assumption of the so called *weak separation condition*, using self-similar tilings as auxiliary systems, we work out a rather general method to derive the graph-directed structures of self-affine sets with overlaps; many applications are found, for example, to study the smoothness of the density of a self-similar measure.

Self-similar tilings. Since 1998 I have been interested in tiling theory. I mainly study two kinds of self-similar tilings.

The first is the self-affine tiling, which is generated by an expanding matrix and a digits set. We describe the structure of the translation sets and characterize the IFS's which generates tilings (i.e., satisfy open set condition).

The second is tilings by atomic surface of Pisot unit substitution. Atomic surfaces are also called Rauzy fractals. We use atomic surfaces to construct self-similar tilings and Markov partitions. I am interested in the applications of tiling theory in number theory, for example, the arithmetic properties of beta-expansions. The relation between the combinatorial properties of substitutions, the dynamical properties and tiling properties of the atomic surface is an interesting object.

Words and complexity. I am interested in the complexities of words, especially words with low complexities. The theory of atomic surfaces is used to study the properties of Sturmian sequence. I also work on *pattern complexity*, a new complexity introduced by T. Kamae.

TEACHINGS

Undergraduate Course:

1. *Advanced calculus*

1993.09-1994.01, Huazhong University of Science and Technology.

2005.02-2005.07, Tsinghua University.

2. *Linear algebra*

1994.02-1994.07, Huazhong University of Science and Technology.

3. *The continued fractions*
1998.02-1998.04, The chinese Univeristy if Hong Kong.

4. *Fractal geometry*
1998.09-1999.01, Wuhan University.

5. *Mathematical analysis*
2000.01-2000.07, Wuhan University.

6. *Complex analysis*
2004.09-2005.01, Tsinghua University.

Graduate Courses:

6. *Tiling and algebra*
1998.09-1999.01, Wuhan University.

7. *Fourier analysis*
2000.02-2000.07, Wuhan University.

Lectures at conferences

1. Lipschitz equivalence of self-similar sets. *Conference on " Quasi-periodic tilings and related topics"*. Kyoto, Japan, Jan. 30–Feb. 1, 2006.

2. Periods of β-expansions and linear recurrent sequences. *Conference on Applicable Harmonic Analysis*, Hangzhou, China, May 23–27, 2005.

3. Atomic surfaces, tilings and coincidences: reducible case. *Workshop on "Substitutions généralisées, pavages et numération.* Grenoble, France, March 13-28, 2005.

4. Certain partitions of the set of integers, *Conference on "Fractal geometry and dynamical system"*. Nanjing, China, August 28-September 3.

5. Purely beta-expansions with Pisot unit base, *Workshop on "Substitutions généralisées, pavages et numération.* Marsaille, France, March 18-23, 2002

6. Quasi-crystals and non-periodic tilings, *Conference on " Quasi-periodic tilings and related topics"*. Kyoto, Japan, June 6-10, 2001.

7. Connectedness of self-similar tiles, *Conference on " Fractal and Wavelets"*. HongKong, December 12-20, 2000.

8. Using self-affine tiling as an auxiliary system to study IFS with overlaps, *Conference on "Fractal objects in nature"*. Bielefield, Germany, March 20-30, 2000.

9. On self-affine tilings, *Conference of China on fractal geometry*, Xuzhou, China, June 2-10, 1998.

PUBLICATIONS

1. H. Rao, H.J. Ruan and L.F. Xi, Lipschitz equivalence of self-similar sets. *C. R. Acad. Sci. Paris Ser. I* **342** (2006), 191–196.

2. T. Kamae and H. Rao, Maximal pattern complexity over ℓ letters. *Europe J. Comb.* **27** (2006), no. 1, 125–137.

3. C. Bandt, N.V. Hung and H. Rao, On open set condition for self-similar sets. *Proceeding AMS.* **134** (2006), 1369–1374.

4. Y.H. Qu, H. Rao and Y.M. Yang, Periods of β-expansions and linear recurrent sequences. *Acta. Arith.* **120** (2005) no. 1, 27–37.

5. S. Ito and H. Rao, On purely periodic β-expansions with Pisot unit base. *Proc. Amer. Math. Soc.* **133** (2005), no. 4, 953–964.

6. S. Akiyama, H. Rao and W. Steiner, A certain finiteness property of Pisot number systems. *J. Number Theory* **107** (2004), no. 1, 135–160.

7. I. Kirat, K.S. Lau and H. Rao, Expanding polynomials and connectedness of self-affine tiles. *Discrete Comput. Geom.* **31** (2004), no. 2, 275–286.

8. S. Akiyama and H. Rao, New criteria for canonical number systems. *Acta Arith.* **111** (2004), no. 1, 5–25.

9. X.G. He, K.S. Lau and H. Rao, Self-affine sets and graph-directed systems. *Constr. Approx.* **19** (2003), no. 3, 373–397.

10. K.S. Lau and H. Rao, On one-dimensional self-similar tilings and pq-tiles. *Trans. Amer. Math. Soc.* **355** (2003), no. 4, 1401–1414.

11. X.G. He, K.S. and H. Rao, On the self-affine sets and the scaling functions. Wavelet analysis (Hong Kong, 2001), 179–195, Ser. Anal., 1, World Sci. Publishing, River Edge, NJ, 2002.

12. J. Luo , H. Rao and B. Tan , Topological Structure of Self-Similar Sets, *Fractals* **10:1** (2002).

13. A.H. Fan, K.S. Lau and H. Rao, Relationships between different dimensions of a measure. *Monatsh. Math.* **135** (2002), no. 3, 191–201.

14. J.H. Ma, H. Rao and Z.Y. Wen, Dimensions of cookie-cutter-like sets, *Science in China, Series A* **44** (2001:11),1400-1412.

15. K.S. Lau, H. Rao and Y.L. Ye, Corrigendum to: Iterated function system and Ruelle operater, *J. Math. Analysis Appl.* **262** (2001), 446-451.

16. C.Q. Qu, H. Rao and W.Y. Su, Hausdorff measure of homogeneous Cantor set, *Acta Math. Sinica (English Series)* **17:1** (2001), 15-20.

17. K.S. Lau, S.M. Ngai and H. Rao, Iterated function systems with overlaps and self-similar measures, *J. London Math. Soc.***63:2** (2001), 99-116.

18. S. Hua and H. Rao, Structures of self-similar sets with overlaps, *Chinese Annal. Math.* **21B:4**(2001), 403-412.

19. S. Hua, H. Rao, Z.Y. Wen and J. Wu, On the structures and dimensions of Moran sets, *Science in China, Series A* **43** (2000:8), 836-852.

20. H. Rao and Z.Y. Wen, A class of self-similar fractals with overlap structure, *Adv. Appl. Math.* **20:1** (1998),50-72.

21. H. Rao, Z.Y. Wen and J. Wu, The net measure properties of Moran sets and its applications, *Chinese Sci. Bull.* **43:5** (1998), 386-389.

22. D.J. Feng, H. Rao and J. Wu, The Hausdorff dimension of one-dimensional homogeneous Cantor sets, *Chinese Ann. Math. Ser.* **18:3** (1997), 331-336.

23. D.J. Feng, H. Rao and J. Wu, The net measure properties of symmetric Cantor sets and their applications, *Progress of Natural Science (English Ed.)* **7:2** (1997),172-178.

24. D.J. Feng, H. Rao and M. Wu, The regularity of self-similar sets, *Progress of Natural Science (Chinese Ed.)* **6** (1996), 287-289.

Papers to appear

1. S. Ito and H. Rao, Atomic surfaces, tilings and coincidence I: Irreducible case. To appear in *Israel J. Math.*

2. H. Ei, S. Ito and H. Rao, *Atomic surfaces, tilings and coincidences II: Reducible case,* Accepted by Annal. Inst. Fourier. (Grenoble)

3. V. Berthé, H. Ei, S. Ito and H. Rao, *On substitution invariant Sturmian words: an application of Rauzy fractals.* Accepted by Theoretical Informatics and Applications.

4. T. Kamae, H. Rao, B. Tan and Y.M. Xue, *Language structure of pattern Sturmian words.* Accepted by Discrete Mathematics.

Preprints

1. T. Kamae, H. Rao and Y.M. Xue, *Maximal pattern complexity of two dimensional words,* preprint 2004.

2. V. Berthé and H. Rao, On super-coincidence condition. Preprint 2005.

3. H. Rao and J. Tamura, *Certain partitions of the set of integers,* preprint 2002.