

## CURRICULUM VITAE

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### Xiang-dong Hou

Department of Mathematics

University of South Florida, Tampa, FL 33620-5700

Phone: (813)-974-2561, E-mail Address: [xhou@math.usf.edu](mailto:xhou@math.usf.edu)

Web page : <http://www.math.usf.edu/~xhou/>

### Education —

B.S. in mathematics, University of Science and Technology of China (Hefei, Anhui) 1982

M.S. in mathematics, University of Science and Technology of China (Hefei, Anhui) 1985

Ph.D. in mathematics, University of Illinois at Chicago 1990

### Academic Experience —

Assistant Professor, Wright State University, 1990 – 1996

Associate Professor, Wright State University, 1996 – 2002

Professor, Wright State University, 2002 — 2003

Assistant Professor, University of South Florida, 2003 – 2007

Associate Professor, University of South Florida, 2007 – now

Visiting Professor, Université de Toulon, France, Aug. 1996 – Sept. 1996

Visiting Associate Professor, Ohio State University, Sept. 1997 – June 1998

Visiting Scholar, Institut Nationale de Recherche en Informatique et en Automatique (INRIA), France, April 1998

Courtesy Visit, Department of Mathematics, University of Florida, July 1999 – Sept. 1999

Visiting Scholar, National University of Singapore, Dec. 2000

### Research Interests —

- Algebra: Finite fields, finite rings, chain rings, Galois rings, finite local Frobenius rings, classical groups over finite fields
- Number Theory: Exponential sums, isomorphism classes of  $p$ -adic fields
- Coding Theory and Cryptography: Covering radius, Reed-Muller codes, number of inequivalent codes, group actions on Boolean functions, resilient functions
- Combinatorics: Bent functions, difference sets, partial difference sets, relative difference sets

### Scholarship —

#### Scholarly Publications —

- (1) X. Hou, *Bloch functions in the unit ball of  $\mathbb{C}^n$* , Chinese Math. Annual Ser. A **8** (1987), 287 – 299.
- (2) X. Hou, *A note on the characterizations of type-1  $\lambda$ -designs*, ARS Combinatoria **29** (1990), 271 – 276.
- (3) X. Hou, *Some results on the norm of codes*, IEEE Trans. Inform. Theory **36** (1990), 683 – 685.
- (4) X. Hou, *New lower bounds for covering codes*, IEEE Trans. Inform. Theory **36** (1990), 895 – 899.
- (5) X. Hou, *An improved sphere covering bound for the codes with  $n = 3R + 2$* , IEEE Trans. Inform. Theory **36** (1990), 1476 – 1478.
- (6) X. Hou, *Binary linear quasi-perfect codes are normal*, IEEE Trans. Inform. Theory **37** (1991), 378 – 379.

- (7) X. Hou, *On the covering radius of subcodes of a code*, IEEE Trans. Inform. Theory **37** (1991), 1706 – 1707.
- (8) X. Hou, *The  $\lambda$ -designs with  $e_1 = 4$* , ARS Combinatoria **32** (1991), 319 – 329.
- (9) X. Hou, *On the  $G$ -matrices with entries and eigenvalues in  $\mathbb{Q}(i)$* , Graph and Combinatorics **8** (1992), 53 – 64.
- (10) X. Hou, *Some inequalities about the covering radius of Reed-Muller codes*, Des. Codes Cryptogr. **2** (1992) 215 – 224.
- (11) X. Hou, *Some results on the covering radii of Reed-Muller codes*, IEEE Trans. Inform. Theory **39** (1993), 366 – 378.
- (12) X. Hou, *Further results on the covering radii of the Reed-Muller codes*, Des. Codes Cryptogr. **3** (1993), 167 – 177.
- (13) X. Hou, *Classification of cosets of the Reed-Muller code  $R(m - 3, m)$* , Discrete Math. **128** (1994), 203 – 224.
- (14) X. Hou,  *$AGL(m, 2)$  acting on  $R(r, m)/R(s, m)$* , J. Algebra **171** (1995), 921 – 938.
- (15) X. Hou,  *$GL(m, 2)$  acting on  $R(r, m)/R(r - 1, m)$* , Discrete Math. **149** (1996), 99 – 122.
- (16) X. Hou, *On the covering radius of  $R(1, m)$  in  $R(3, m)$* , IEEE Trans. Inform. Theory **42** (1996), 1035 – 1037.
- (17) X. Hou, *The covering radius of  $R(1, 7)$  — a simpler proof*, J. Combin. Theory A **74** (1996), 337 – 341.
- (18) X. Hou, *The covering radius of  $R(1, 9)$  in  $R(4, 9)$* , Des. Codes Cryptogr. **8** (1996), 285 – 292.
- (19) X. Hou, *On the centralizer of the centralizer of a matrix*, Linear Alg. and Appl. **256** (1997), 251 – 261.
- (20) X. Hou, *The Reed-Muller code  $R(1, 7)$  is normal*, Des. Codes Cryptogr. **12** (1997), 75 – 82.
- (21) X. Hou, *On the norm and covering radius of the first order Reed-Muller codes*, IEEE Trans. Inform. Theory **43** (1997), 1025 – 1027.
- (22) X. Hou and P. Langevin, *Results on bent functions*, J. Combin. Theory A **80** (1997), 232 – 246.
- (23) X. Hou, J. Lahtonen and S. Koponen, *The Reed-Muller code  $R(r, m)$  is not  $\mathbb{Z}_4$ -linear for  $3 \leq r \leq m - 2$* , IEEE Trans. Inform Theory **44** (1998), 798 – 799.
- (24) X. Hou, *Cubic bent functions*, Discrete Math. **189** (1998), 149 – 161.
- (25) X. Hou,  *$q$ -ary bent functions constructed from chain rings*, Finite Fields Appl. **4** (1998), 55 – 61.
- (26) X. Hou, *New constructions of bent functions*, J. Combin. Inform. and System Sci. **25** (2000), 173 – 189.
- (27) X. Hou, *On the coefficients of binary bent functions*, Proc. Amer. Math. Soc. **128** (2000), 987 – 996.
- (28) X. Hou, *Bent functions, partial difference sets and quasi-Frobenius local rings*, Des. Codes Cryptogr. **20** (2000) 251 – 268.
- (29) X. Hou and S. Sehgal, *An extension of building sets*, J. Combin. Designs **8** (2000), 50 – 57.
- (30) X. Hou and S. Sehgal, *Two generalized constructions of relative difference sets*, J. Alg. Combin. **12** (2000), 145 – 153.
- (31) X. Hou, K. H. Leung and Q. Xiang, *New partial difference sets in  $\mathbb{Z}_{p^2}^t$  and a related problem about Galois rings*, Finite Fields Appl. **7** (2001), 165 – 188.
- (32) X. Hou, *Finite commutative chain rings*, Finite Fields Appl. **7** (2001), 382 – 396.
- (33) X. Hou, *The eigenmatrix of the linear association scheme on  $R(2, m)$* , Discrete Math. **237** (2001), 163 – 184.

- (34) X. Hou, *New partial difference sets in  $p$ -groups*, J. Combin. Designs **10** (2002), 394 – 402.
- (35) X. Hou, K. H. Leung and Q. Xiang, *A generalization of an addition theorem of Kneser*, J. Number Theory **97** (2002), 1 – 9.
- (36) X. Hou, *On binary resilient functions*, Des. Codes, Cryptogr., **28** (2003), 93 – 112.
- (37) X. Hou, K. H. Leung and S. L. Ma, *On the groups of units of finite commutative chain rings*, Finite Fields Appl., **9** (2003), 20 – 38.
- (38) X. Hou, *Rings and constructions of partial difference sets*. Discrete Math., **270** (2003), 149 – 176.
- (39) X. Hou, *Group actions on binary resilient functions*, AAECC **14** (2003), 97 – 115.
- (40) X. Hou, *Elementary divisors of tensor products and  $p$ -ranks of binomial matrices*, Linear Alg. Appl., **374** (2003), 255 – 274.
- (41) X. Hou and K. Keating, *Enumeration of isomorphism classes of extensions of  $p$ -adic fields*, J. Number Theory, **104** (2004), 14 – 61.
- (42) X. Hou, *Solution to a problem of S. Payne*, Proc. Amer. Math. Soc., **132** (2004), 1–8.
- (43) X. Hou, *A note on the proof of Niho’s conjecture*, SIAM J. Discrete Math. **18** (2004), 313 – 319.
- (44) X. Hou,  *$p$ -ary and  $q$ -ary versions of certain results about bent functions and resilient functions*, Finite Fields Appl. **10** (2004), 566 – 582.
- (45) X. Hou, *Enumeration of certain affine invariant extended cyclic codes*, J. Combin. Theory A, **110** (2005), 71 – 95.
- (46) X. Hou, *A note on the proof of a theorem of Katz*, Finite Fields Appl., **11** (2005), 316 – 319.
- (47) X. Hou, *A ring theoretic construction of Hadamard difference sets in  $\mathbb{Z}_8^n \times \mathbb{Z}_2^n$* , J. Alg. Combin., **22** (2005), 181 – 187.
- (48) X. Hou, *On the asymptotic number of non-equivalent  $q$ -ary linear codes*, J. Combin. Theory A **112** (2005), 337 – 346.
- (49) X. Hou, *Affinity of permutations of  $\mathbb{F}_2^n$* , Discrete Appl. Math. **154** (2006), 313 – 325.
- (50) W. E. Clark, X. Hou, and A. Mihailovs, *The affinity of a permutation of a finite vector space*, Finite Fields Appl., **13** (2007), 80 – 112.
- (51) X. Hou and A. Nechaev, *A construction of finite Frobenius rings and its application to partial difference sets*, J. Algebra **309** (2007), 1 – 9.
- (52) X. Hou, *On the asymptotic number of non-equivalent binary linear codes*, Finite Fields Appl., **13** (2007), 318 – 326.
- (53) X. Hou, *On the asymptotic number of inequivalent binary self-dual codes*. J. Combin. Theory A, **114** (2007), 522 – 544.
- (54) X. Hou, *Explicit evaluation of certain exponential sums of binary quadratic functions*, Finite Fields Appl., **13** (2007), 843 – 868.
- (55) X. Hou, *On a vector space analogue of Kneser’s theorem*. Linear Algebra Appl. **426** (2007) 214 – 227.
- (56) X. Hou, *On the number of inequivalent binary self-orthogonal codes*, IEEE Trans. Inform. Theory **53** (2007), 2459 – 2479.
- (57) X. Hou, *The number of inequivalent binary self-orthogonal codes of dimension 6*, in Advances in Coding Theory and Cryptology, Series on Coding Theory and Cryptology, **2**, 244 – 256, edited by T. Shaska, W. C. Huffman, D. Joyner, V. Ustimenko, World Scientific Publishing Co. Pte. Ltd., Hackensack, NJ, 2007.
- (58) X. Hou, *On the dual of a Coulter-Matthews bent function*, Finite Fields Appl., **14** (2008), 505 – 514.
- (59) X. Hou and G. McColm, *When is betweenness preserved?* Rocky Mountain J. Math., **38** (2008), 123 – 137.

- (60) X. Hou, *Hurwitz equivalence in tuples of generalized quaternion groups and dihedral groups*, *Electronic Journal of Combinatorics* **15** (2008), #R80
- (61) X. Hou, *Asymptotic numbers of non-equivalent codes in three notions of equivalence*. *Linear and Multilinear Alg.*, **57** (2009), 111 – 122.
- (62) X. Hou, *On the analytic solution of the Cauchy problem*, *Proc. Amer. Math. Soc.*, **137** (2009), 597 – 606.
- (63) X. Hou, S. R. López-Permouth, B. R. Parra-Avila, *Rational power series, sequential codes and periodicity of sequences*, *J. Pure Appl. Alg.*, **231** (2009), 1157 – 1169.
- (64) X. Hou, G. L. Mullen, *Number of irreducible polynomials and pairs of relatively prime polynomials in several variables over finite fields*, *Finite Fields Appl.*, Available online 31 December 2008.

#### Papers Currently Submitted —

- (1) S. Draper and X. Hou, *Explicit evaluation of certain exponential sums of quadratic functions over  $\mathbb{F}_{p^n}$ ,  $p$  odd*.
- (2) X. Hou, *On certain diagonal equations over finite fields*.

#### Papers In Preparation —

- (1) X. Hou, *On the number of non-equivalent codes*.
- (2) X. Hou, G. L. Mullen, J. A. Sellers, J. Yucas, *Reversed Dickson permutation polynomials over finite fields*.

#### Books In Preparation —

- (1) X. Hou, *Lectures on Finite Fields*.

#### Technical Reports —

- (1) X. Hou and S. Sehgal, *Building sets and semi-regular divisible difference sets*, Technical report 98-4, The Ohio State Univ. Math. Research Institute, 1998.
- (2) X. Hou and S. Sehgal, *Two generalized constructions of relative difference sets*, Technical report 98-9, The Ohio State Univ. Math. Research Institute, 1998.
- (3) W. E. Clark, X. Hou and A. Mihailovs, *The affinity of a permutation of a finite vector space*, Technical report 2004-3, Department of Mathematics, Tennessee Technological University, 2004.

#### Conference Talks —

- (1) *Some results on the covering radii of codes*, IEEE International Symposium on Information Theory (San Diego, CA) January 1990.
- (2) *Binary linear quasi-perfect codes are normal*, Marshall Hall Conference (Burlington, VT) September 1990.
- (3) *On the covering radius of Reed-Muller codes*, Sixth Midwestern Conference on Combinatorics, Cryptography and Computing (Lincoln, NE) October 1991.
- (4) *Classification of cosets of the Reed-Muller code  $R(m-3, m)$* , IEEE International Symposium on Information Theory (San Antonio, TX) January 1993.
- (5)  *$GL(m, 2)$  acting on  $R(r, m)/R(r-1, m)$* , Shanghai Conference on Designs, Codes and Finite Geometries (Shanghai, China) May 1993.
- (6)  *$AGL(m, 2)$  acting on the cosets of the Reed-Muller codes*, The Ohio State University – Denison University Conference on Groups, Rings and Combinatorics (Columbus, OH) March 1994.
- (7) *Recent results on Reed-Muller codes*, American Mathematical Society (Chicago, IL) March 1995.

- (8) *Cosets of the Reed-Muller codes*, The Mediterranean Workshop on Coding and Information Integrity Palma, Spain February 1996.
- (9) *Cubic bent functions*, The Ohio State University – Denison University Conference on Groups, Rings and Combinatorics (Granville, OH) May 1996.
- (10) *New constructions of bent functions*, The International Conference on Combinatorics, Information Theory and Statistics (Portland, ME) July 1997.
- (11) *On the coefficients of binary bent functions*, American Mathematical Society (Louisville, KY) March 1998.
- (12) *Building sets and semi-regular divisible difference sets*, The XXIVth Ohio State-Denison Mathematics Conference (Granville, OH) May 1998.
- (13) *New Nonlinear codes constructed from the Reed-Muller codes*, American Mathematical Society (Chicago, IL) Sept. 1998.
- (14) *New partial difference sets in  $\mathbb{Z}_{p^2}^t$  and a related problem about Galois rings*, International Conference on Algebra and Its Applications (Athens, OH) March, 1999.
- (15) *Rings and constructions of partial difference sets*, American Mathematical Society (South Bend, IN) April 2000.
- (16) *The eigenmatrix of the linear association scheme on  $R(2, m)$* , The XXVth Ohio State-Denison Mathematics Conference (Columbus, OH) May 2000.
- (17) *The eigenmatrix of the linear association scheme on  $R(2, m)$* , World Multiconference on Systemics, Cybernetics and Informatics (Orlando, FL) July, 2000.
- (18) *New partial difference sets in abelian  $p$ -groups*, American Mathematical Society (Columbus, OH) September 2001.
- (19) *Group actions on binary resilient functions*, The XXVIth Ohio State-Denison Mathematics Conference (Granville, OH) May 2002.
- (20) *Group actions on binary resilient functions*, International Conference on Cryptography (Porquerolles, France) June 2002.
- (21) *Affinity of permutations of  $\mathbb{F}_2^n$* , Workshop on Coding and Cryptography (Versailles, France) March 2003.
- (22) *Enumeration of certain affine invariant extended cyclic codes*, American Mathematical Society (Athens, OH) March 2004.
- (23) *Skew polynomials, semi-linear transformations and the number of non-equivalent codes*, The XXVIIIth Ohio State-Denison Mathematics Conference (Columbus, OH) June 2004.
- (24) *Enumeration of  $\text{AGL}(\frac{m}{3}, \mathbb{F}_{p^3})$ -invariant extended cyclic codes*, American Mathematical Society (Evanston, IL) October 2004.
- (25) *Asymptotic numbers of non-equivalent codes in three notions of equivalence*, American Mathematical Society (Atlanta, GA) January 2005.
- (26) *On the asymptotic numbers of inequivalent binary self-dual codes*, American Mathematical Society (Newark, DE) April 2005.
- (27) *On the number of inequivalent binary self-orthogonal codes*, SIAM Conference on Discrete Mathematics (Victoria, BC) June 25 – 28, 2006.
- (28) *On the number of inequivalent binary self-orthogonal codes*, American Mathematical Society (Cincinnati, OH) October 21 – 22, 2006.
- (29) *A construction of finite Frobenius rings and its application*, American Mathematical Society and Sociedad Matemática Mexicana VII Joint Meeting, Zacatecas, México, May 23 – 26, 2007.
- (30) *New results on self-orthogonal codes*, American Mathematical Society (Chicago, IL) October 5 – 6, 2007.
- (31) *Rational power series and sequential codes*, American Mathematical Society (Kalamazoo, MI) October 17 – 19, 2008.

**Other Invited Talks** —

- (1) *Mathematical problems arising from cryptography*, University of Tampa, Department of Mathematics Colloquium, April 16, 2004.
- (2) *On the dual of a Coulter-Matthews bent function*, Wright State University, Department of Mathematics and Statistics, Colloquium, Dayton, OH, Oct. 20, 2006.
- (3) *Finite Frobenius rings and applications*, Ohio University Center for Ring Theory and its Applications, Lecture Series, May 8-11, 2007.

**Grants and Contracts** —

- (1) *Coset Structure and Covering Radii of Reed-Muller Codes*, NSA, 1993-1995.
- (2) *Two Projects in Algebra and Combinatorics*, NSA, 2002-2005.

**Professional Services** —**Journal Editorial Board** —

- Journal of Algebra and Its Applications

**Journal Referee** —

- Acta Mathematicae Applicatae Sinica
- Applicable Algebra in Engineering, Communications, and Computing
- Applied Discrete Mathematics
- Communications in Algebra
- Designs, Codes and Cryptography
- Electronic Journal of Combinatorics
- Finite Fields and Their Applications
- IEEE Transactions on Information Theory
- Indian Journal of Mathematics
- Journal of Algebra and Its Applications
- Journal of Combinatorial Theory, Series A
- Journal of Statistical Planning and Inference
- Linear Algebra and Its Applications
- Linear and Multilinear Algebra
- SIAM Journal of Discrete Mathematics

**Conference Proceedings Referee** —

- Proceedings of the 9th International Symposium on Applied Algebra (New Orleans, 1991)
- Proceedings of the Jerusalem Combinatorics '93 Conference
- IEEE International Symposium on Information Theory (Canada, 1995)
- The 12th International Symposium on Applied Algebra, Algebraic Algorithms and Error Correcting Codes (Toulouse, 1997)
- The XXVth Ohio State - Denison Math Conference (2000)
- International Workshop on Sequence Design and its Applications in Communications (IWSDA'05), Shimonoseki, Japan

**AMS Math Review** —

- I have been a reviewer for *Mathematical Reviews* since 2004.

**Textbook Review** —

- Discrete Mathematics with Graph Theory by Edgar G. Goodaire and Michael M. Parmenter, 3rd ed., Pearson Prentice Hall, Upper Saddle River, NJ, 2006