Curriculum Vitae for
Frederick John Hickernell

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Contact Information

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Current Research Areas

Numerical analysis, computational complexity

Multi-dimensional integration and approximation

Quasi-Monte Carlo methods

Experimental design

Education

PhD in mathematics, Massachusetts Institute of Technology, 1981

BA (summa cum laude) in mathematics and physics, Pomona College, 1977

Employment History

2005–present	Professor and Chair of Applied Mathematics, Illinois Institute of Technology
1999–2005	Professor of Mathematics, Hong Kong Baptist University
1989–2002	Head of Mathematics, Hong Kong Baptist University
1995–1999	Associate Professor of Mathematics, Hong Kong Baptist University
1987–1995	Senior Lecturer in Mathematics, Hong Kong Baptist College
1985–1987	Lecturer in Mathematics, Hong Kong Baptist College
1981–1985	Assistant Professor of Mathematics, University of Southern California

Professional and Honorary Society Memberships

American Mathematical Society

American Scientific Affiliation, Fellow by election

American Statistical Association

Hong Kong Statistical Society

Institute for Operations Research and the Management Sciences

Institute of Electrical and Electronics Engineers, Senior Member

Institute of Mathematical Statistics, Fellow by election

International Statistical Institute, by election

Mathematical Association of America

Phi Beta Kappa, by election

Sigma Xi, by election

Society for Industrial and Applied Mathematics

Subjects Taught

summarized by subject content rather than by code and title

Mathematics Subjects — various sections of calculus for mathematics, science, engineering, and business majors

Applied Mathematics Subjects — differential equations for mathematics, science and engineering majors, mathematical modeling for final year mathematics majors

Computational Subjects — numerical methods for mathematics majors, theoretical numerical analysis for final year mathematics majors, applied numerical methods for science majors, numerical partial differential equations, data analysis and visualization for MSc students

Statistics Subjects — introductory computer-based statistics for non-majors, first-year statistics for mathematics majors, regression

Laboratory Subjects — computer laboratories in mathematical and statistical software such as MATLAB and SAS for undergraduate mathematics majors and MSc students, a computer laboratory for calculus instruction

Project Subjects — half-year and full-year mathematics undergraduate honours projects, MSc scientific computing theses

Research Students and Postdoctoral Fellows Supervised

Year indicates when they completed their studies. Cited publications were co-authored with them based on work before, during or after their studies.

AI Mingyao, Postdoc, 2003–2005, [3, 94]

Josef DICK, Postdoc, 2004–2005, presently at University of New South Wales [4, 1]

CHOW Chi Kin, MPhil, 1991

Regina HONG Hee Sun, PhD, 2002 [19, 20, 30, 37, 75, 80], presently in Germany

HUANG Fanglun, PhD, 2004, presently a professor in Anhui University

Peter KRITZER, Postdoc, 2007, presently a postdoc at University of Salzburg [2]

LEUNG King Tai, BSc, 2004 [67], presently a PhD student at HKBU

LI Dong, BSc, 2002 [73, 99], presently at the Institute for Advanced Studies in Princeton

LI Yiou, PhD student, 2009–present

LIU Kwong Ip, PhD, 2007, presently an assistant lecturer at Hong Kong Baptist University [66, 71, 1, 96, 97]

LIU Minqian, Postdoc, 2000–2002, presently a professor at Nankai University [8, 9, 21, 23]

MA Jingtang, Postdoc, 2004–2005 [99], presently at the Chinese Academy of Sciences

NIU Ben, PhD student, 2006–present [93]

WONG Mei Ning, MPhil, 2002 [97], presently a secondary school teacher in Hong Kong

YAM Chiu Yu, MPhil, 2000 [31], presently a programmer in Hong Kong

YANG Shijun, Postdoc, 2006–2007, [5]

YUE Rong Xian, PhD, 1997 [10, 15, 14, 24, 25, 29, 33, 38, 43, 77, 101], presently a professor and associate dean at Shanghai Normal University

ZENG Xiaoyin, PhD, 2008, presently a postdoc at Argonne National Laboratory [67, 95, 2, 99, 101]

ZHANG Yizhi, MSc student, 2008–present

ZHANG Yonglin, PhD, 2004

Publications

Database entries for *Mathematical Reviews (MR)* and *Zentralblatt für Mathematik (ZM)* are given where available.

Refereed Journal Articles

[1] K. I. Liu, J. Dick, and F. J. Hickernell, *A multivariate fast discrete Walsh transform with an application to function interpolation*, Math. Comp. **78** (2009), 1573–1591.

[2] X. Y. Zeng, P. Kritzer, and F. J. Hickernell, *Spline methods using integration lattices and digital nets*, Constr. Approx. (2009), to appear.

[3] M. Ai, F. J. Hickernell, and D. K. J. Lin, *Optimal foldover plans for regular s-level fractional factorial designs*, Statist. Probab. Lett. **78** (2008), 896–903.

[4] F. J. Hickernell and J. Dick, *An algorithm-driven approach to error analysis for multidimensional integration*, Int. J. Numer. Anal. Model. **5** (2008), 167–189.

[5] F. J. Hickernell and S. Yang, *Explicit Hermite interpolation polynomials via the cycle index with applications*, Int. J. Numer. Anal. Model. **5** (2008), 457–465.

[6] J. J. Liang, K. T. Fang, and F. J. Hickernell, *Some necessary uniform tests for spherical symmetry*, Ann. Inst. Statist. Math. **60** (2008), 679–696.

[7] K. Feng, L. Xu, and F. J. Hickernell, *Linear error-block codes*, Finite Fields Appl. **12** (2006), 638–652.

[8] M. Q. Liu, K. T. Fang, and F. J. Hickernell, *Connections among different criteria for asymmetrical fractional factorial designs*, Statist. Sinica **16** (2006), 1285–1297.

[9] M. Q. Liu and F. J. Hickernell, *The relationship between discrepancies defined on a domain and on its subset*, Metrika **63** (2006), 317–327.

[10] R. X. Yue and F. J. Hickernell, *Strong tractability of multivariate integration over Banach spaces*, SIAM J. Numer. Anal. **44** (2006), 2559–2583.

[11] G. Fang, F. J. Hickernell, and H. Li, *Approximation on anisotropic multivariate Besov classes of functions by standard information*, J. Complexity (2005), 294–313.

[12] F. J. Hickernell, C. Lemieux, and A. B. Owen, *Control variates for quasi-Monte Carlo*, Statist. Sci. **20** (2005), 1–31.

[13] F. J. Hickernell, I. H. Sloan, and G. W. Wasilkowski, *A piece-wise constant algorithm for weighted L_1 approximation over bounded or unbounded regions*, SIAM J. Numer. Anal. **43** (2005), 1003–1020.

[14] R. X. Yue and F. J. Hickernell, *Strong tractability of integration using scrambled Niederreiter points*, Math. Comp. **74** (2005), 1871–1893.

[15] S. Heinrich, F. J. Hickernell, and R. X. Yue, *Optimal quadrature for Haar wavelet spaces*, Math. Comp. **73** (2004), 259–277.

[16] F. J. Hickernell, I. H. Sloan, and G. W. Wasilkowski, *On strong tractability of weighted multivariate integration*, Math. Comp. **73** (2004), 1903–1911.

[17] ———, *On tractability of weighted integration over bounded and unbounded regions in $\mathbb{R}^s$*, Math. Comp. **73** (2004), 1885–1901.

[18] F. J. Hickernell and H. Niederreiter, *The existence of good extensible rank-1 lattices*, J. Complexity **19** (2003), 286–300, *MR* 1 984 115.

[19] H. S. Hong and F. J. Hickernell, *Implementing scrambled digital nets*, ACM Trans. Math. Software **29** (2003), 95–109.

[20] H. S. Hong, F. J. Hickernell, and G. Wei, *The distribution of the discrepancy of scrambled digital (t, m, s)-nets*, Math. Comput. Simulation **62** (2003), 335–345, *MR* 1 988 381, *ZM* pre01912339.

[21] F. J. Hickernell and M. Q. Liu, *Uniform designs limit aliasing*, Biometrika **89** (2002), 893–904, *MR* 2003h:62116.

[22] F. J. Hickernell and X. Wang, *The error bounds and tractability of quasi-Monte Carlo algorithms in infinite dimension*, Math. Comp. **71** (2002), 1641–1661, *MR* 2003i:65009, *ZM* pre01802731.

[23] M. Q. Liu and F. J. Hickernell, *$E(s^2)$-optimality and minimum discrepancy in 2-level supersaturated designs*, Statist. Sinica **12** (2002), 931–939, *MR* 2003h:62113, *ZM* 1002.62059.

[24] R. X. Yue and F. J. Hickernell, *The discrepancy and gain coefficients of scrambled digital nets*, J. Complexity **18** (2002), 135–151, *MR* 2003g:11086, *ZM* pre01750220.

[25] ———, *Robust designs for smoothing spline ANOVA models*, Metrika **55** (2002), 161–176, *MR* 2003d:62108.

[26] F. J. Hickernell and H. Woźniakowski, *The price of pessimism for multidimensional quadrature*, J. Complexity **17** (2001), 625–659, *MR* 2002m:60013, *ZM* 1006.65022.

[27] ———, *Tractability of multivariate integration for periodic functions*, J. Complexity **17** (2001), 660–682, *MR* 2003g:65028, *ZM* 1006.65023.

[28] J. J. Liang, K. T. Fang, F. J. Hickernell, and R. Li, *Testing multivariate uniformity and its applications*, Math. Comp. **70** (2001), 337–355, *MR* 2001f:62032, *ZM* 991.72287.

[29] R. X. Yue and F. J. Hickernell, *Integration and approximation based on scramble sampling in arbitrary dimensions*, J. Complexity **17** (2001), 881–897, *MR* 2002m:65005, *ZM* 0995.65005.

[30] F. J. Hickernell, H. S. Hong, P. L'Écuyer, and C. Lemieux, *Extensible lattice sequences for quasi-Monte Carlo quadrature*, SIAM J. Sci. Comput. **22** (2000), 1117–1138, *MR* 2001h:65032, *ZM* 974.65004.

[31] F. J. Hickernell, M. Q. Liu, and Y. C. Yam, *Discrepancy measures of uniformity*, J. Chinese Statistical Association **38** (2000), 353–373 (Chinese).

[32] F. J. Hickernell and H. Woźniakowski, *Integration and approximation in arbitrary dimensions*, Adv. Comput. Math. **12** (2000), 25–58, *MR* 2001d:65017, *ZM* 939.41004.

[33] F. J. Hickernell and R. X. Yue, *The mean square discrepancy of scrambled (t, s)-sequences*, SIAM J. Numer. Anal. **38** (2000), 1089–1112, *MR* 2002c:65009, *ZM* pre1519717.

[34] X. Wang and F. J. Hickernell, *Randomized Halton sequences*, Math. Comput. Modelling **32** (2000), 887–899, *MR* 2001i:65010, *ZM* 965.65005.

[35] F. J. Hickernell, *Goodness-of-fit statistics, discrepancies and robust designs*, Statist. Probab. Lett. **44** (1999), 73–78, *MR* 1 706 366, *ZM* 991.13614.

[36] F. J. Hickernell and Y. C. Hon, *Radial basis function approximation as smoothing splines*, Appl. Math. Comput. **102** (1999), 1–24, *MR* 2000c:41013, *ZM* 990.40074.

[37] F. J. Hickernell and H. S. Hong, *The asymptotic efficiency of randomized nets for quadrature*, Math. Comp. **68** (1999), 767–791, *MR* 99i:65021, *ZM* 990.07842.

[38] R. X. Yue and F. J. Hickernell, *Robust designs for fitting linear models with misspecification*, Statist. Sinica **9** (1999), 1053–1069, *MR* 2000k:62142, *ZM* 940.62071.

[39] F. J. Hickernell, *A generalized discrepancy and quadrature error bound*, Math. Comp. **67** (1998), 299–322, *MR* 98c:65032, *ZM* 889.41025.

[40] F. J. Hickernell and Y. C. Hon, *Radial basis function approximation of the surface wind field from scattered data*, Internat. J. Appl. Sci. Comput. **4** (1998), 221–247, *MR* 1 606 988.

[41] H. Z. An, F. J. Hickernell, and L. X. Zhu, *A new class of consistent estimators for stochastic linear regressive models*, J. Multivariate Anal. **63** (1997), 242–258, *MR* 99b:62098, *ZM* 884.62095.

[42] F. J. Hickernell and Y. X. Yuan, *A simple multi-start algorithm for global optimization*, Oper. Res. Trans. **1** (1997), 1–11.

[43] F. J. Hickernell, R. X. Yue, and F. S. Hickernell, *Statistical modeling for the optimal deposition of sputtered piezoelectric films*, IEEE Trans. Ultrason., Ferroelectrics & Frequency Control **44** (1997), 615–623, prelim. ver. in Proc. 1996 IEEE Ultrason. Symp., 1996, pp. 141–147.

[44] L. X. Zhu, F. J. Hickernell, and H. Z. An, *A goodness-of-fit test for linearity of a stochastic regression model*, Chinese J. Contemp. Math. **18** (1997), 199–206, *MR* 98g:62128, *ZM* 970.42723.

[45] F. J. Hickernell, *The mean square discrepancy of randomized nets*, ACM Trans. Model. Comput. Simul. **6** (1996), 274–296, *ZM* 887.65030.

[46] ———, *Quadrature error bounds with applications to lattice rules*, SIAM J. Numer. Anal. **33** (1996), 1995–2016, corrected printing of Sections 3-6 in ibid., **34** (1997), 853–866, *MR* 97m:6050, *ZM* 855.41024.

[47] B. C. Wei and F. J. Hickernell, *Regression transformation diagnostics for explanatory variables*, Statist. Sinica **6** (1996), 433–454, *MR* 97f:62114, *ZM* 960.33138.

[48] H. Z. An, F. J. Hickernell, and L. X. Zhu, *Universally consistent estimation for stochastic regression models*, Chinese Sci. Bull. **40** (1995), 802–807, *MR* 96f:62113, *ZM* 834.62064.

[49] J. D. Chen and F. J. Hickernell, *A class of asymptotically optimal sequential tests for composite hypotheses*, Sci. China Ser. A **37** (1994), 1314–1324, *MR* 96b:62127, *ZM* 812.62084.

[50] Y. C. Yortsos and F. J. Hickernell, *Linear stability of immiscible displacement processes in porous media*, SIAM J. Appl. Math. **49** (1989), 730–748, *MR* 91a:76085, *ZM* 669.76124.

[51] F. Hickernell and W. Proskurowski, *Design of a calculus microcomputer laboratory*, Comput. Math. Appl. **14** (1987), 3–24.

[52] F. J. Hickernell and Y. C. Yortsos, *Linear stability of miscible displacement processes in porous media in the absence of dispersion*, Stud. Appl. Math **74** (1986), 93–115, *MR* 87e:76073, *ZM* 603.76091.

[53] F. Hickernell and W. Proskurowski, *The use of microcomputers in the teaching of calculus*, Collegiate Microcomputer **3** (1985), 111–125.

[54] F. J. Hickernell, *An upper bound on the growth rate of a linear instability in a homogeneous shear flow*, Stud. Appl. Math **72** (1985), 87–93, *MR* 86c:86002, *ZM* 588.76068.

[55] ———, *Time-dependent critical layers in shear flows on the beta-plane*, J. Fluid Mech. **142** (1984), 431–449, *MR* 86k:76036, *ZM* 561.76056.

[56] ———, *The evolution of large-horizontal-scale disturbances in marginally stable, inviscid, shear flows. I. Derivation of the amplitude evolution equations*, Stud. Appl. Math **69** (1983), 1–21, *MR* 85e:76029a, *ZM* 531.76052.

[57] ———, *The evolution of large-horizontal-scale disturbances in marginally stable, inviscid, shear flows. II. Solutions of the Boussinesq equation*, Stud. Appl. Math **69** (1983), 23–49, *MR* 85e:76029b, *ZM* 531.76053.

[58] W. E. Steinmetz, J. E. Pollard, J. M. Blaney, B. K. Winker, I. K. Mun, F. J. Hickernell, and S. J. Hollenberg, *Conformational analysis of conjugated polyenes by nuclear magnetic resonance and low resolution microwave spectroscopy*, J. Phys. Chem. **83** (1979), 1540–1545.

[59] W. E. Steinmetz, J. Hollenberg, F. Hickernell, C. E. Orr, and L. H. Scharpen, *Conformational analysis of substituted alkenes by low resolution microwave spectroscopy*, J. Phys. Chem. **82** (1978), 940–943.

[60] W. E. Steinmetz, F. Hickernell, I. K. Mun, and L. H. Scharpen, *The conformational analysis of 1-haloalkanes by low resolution microwave spectroscopy*, J. Molec. Spectro. **68** (1977), 173–182.

Book

[61] W. Proskurowski and F. J. Hickernell, *Comp-u-calc (software and user's manual/workbook)*, Saunders College Publishing, Philadelphia, 1988.

Refereed and/or Invited Book Chapters and Conference Papers

[62] K. T. Fang and F. J. Hickernell, *Uniform experimental design*, Encyclopedia of Statistics in Quality and Reliability (F. Ruggeri, R. Kenett, and F. Faltin, eds.), John Wiley & Sons, New York, 2008, pp. 2037–2040.

[63] F. J. Hickernell, G. W. Wasilkowski, and H. Woźniakowski, *Tractability of linear multivariate problems in the average case setting*, Monte Carlo and Quasi-Monte Carlo Methods 2006 (A. Keller, S. Heinrich, and H. Niederreiter, eds.), Springer-Verlag, Berlin, 2008, pp. 423–452.

[64] K. T. Fang, J. J. Liang, F. J. Hickernell, and R. Li, *A stabilized uniform q-q plot to detect non-multinormality*, Random Walks, Sequential Analysis and Related Topics (A. Hsiung, Z. Ying, and C.-H. Zhang, eds.), World Scientific, Singapore, 2006, pp. 254–268.

[65] F. J. Hickernell, *Koksma-Hlawka inequality*, Encyclopedia of Statistical Sciences (S. Kotz, N. L. Johnson, C. B. Read, N. Balakrishnan, and B. Vidakovic, eds.), vol. 6, John Wiley & Sons, Hoboken, NJ, second ed., 2006, pp. 3862–3867.

[66] K. I. Liu and F. J. Hickernell, *Experimental designs using digital nets with small numbers of points*, Monte Carlo and Quasi-Monte Carlo Methods 2004 (H. Niederreiter and D. Talay, eds.), Springer-Verlag, Berlin, 2006, pp. 343–354.

[67] X. Y. Zeng, K. T. Leung, and F. J. Hickernell, *Error analysis of splines for periodic problems using lattice designs*, Monte Carlo and Quasi-Monte Carlo Methods 2004 (H. Niederreiter and D. Talay, eds.), Springer-Verlag, Berlin, 2006, pp. 501–514.

[68] F. J. Hickernell, *Granularity and balance in experimental design*, Contemporary Multivariate Analysis and Experimental Design (J. Fan and G. Li, eds.), Series in Biostatistics, vol. 2, World Scientific, Singapore, 2005, pp. 185–203.

[69] F. J. Hickernell, I. H. Sloan, and G. W. Wasilkowski, *On tractability of weighted integration for certain Banach spaces of functions*, Monte Carlo and Quasi-Monte Carlo Methods 2002 (H. Niederreiter, ed.), Springer-Verlag, Berlin, 2004, pp. 51–71.

[70] ———, *The strong tractability of multivariate integration using lattice rules*, Monte Carlo and Quasi-Monte Carlo Methods 2002 (H. Niederreiter, ed.), Springer-Verlag, Berlin, 2004, pp. 259–273.

[71] K. I. Liu and F. J. Hickernell, *A scalable low discrepancy point generator for parallel computing*, Parallel and Distributed Processing and Applications (J. Cao, L. T. Yang, M. Guo, and F. Lau, eds.), Lecture Notes in Computer Science, vol. 3358, Springer-Verlag, Heidelberg, 2004, pp. 257–262.

[72] F. J. Hickernell, *My dream quadrature rule*, J. Complexity **19** (2003), 420–427, *MR* 1 984 124.

[73] D. Li and F. J. Hickernell, *Trigonometric spectral collocation methods on lattices*, Recent Advances in Scientific Computing and Partial Differential Equations (S. Y. Cheng, C.-W. Shu, and T. Tang, eds.), AMS Series in Contemporary Mathematics, vol. 330, American Mathematical Society, Providence, Rhode Island, 2003, pp. 121–132.

[74] F. J. Hickernell, *Obtaining $O(N^{-2+\epsilon})$ convergence for lattice quadrature rules*, In Fang et al. [85], pp. 274–289, *MR* 1 958 860, *ZM* 1002.62059.

[75] F. J. Hickernell and H. S. Hong, *Quasi-Monte Carlo methods and their randomizations*, Applied Probability (R. Chan, Y.-K. Kwok, D. Yao, and Q. Zhang, eds.), AMS/IP Studies in Advanced Mathematics, vol. 26, American Mathematical Society, Providence, Rhode Island, 2002, pp. 59–77, *MR* 2003g:65006, *ZM* 1007.65003.

[76] Y. Wang and F. J. Hickernell, *An historical overview of lattice point sets*, In Fang et al. [85], pp. 158–167, *MR* 1 958 852, *ZM* 1012.11067.

[77] S. Heinrich, F. J. Hickernell, and R. X. Yue, *Integration of multivariate Haar wavelet series*, Wavelet Analysis and Its Applications (Y. Y. Tang, V. Wickerhauser, P. C. Yuen, and C. H. Li, eds.), Lecture Notes in Computer Science, no. 2251, Springer-Verlag, New York, 2001, pp. 99–106.

[78] F. J. Hickernell, *What affects the accuracy of quasi-Monte Carlo quadrature?*, Monte Carlo and Quasi-Monte Carlo Methods 1998 (H. Niederreiter and J. Spanier, eds.), Springer-Verlag, Berlin, 2000, pp. 16–55, *MR* 2002e:65010, *ZM* 941.65025.

[79] ———, *Lattice rules: How well do they measure up?*, Random and Quasi-Random Point Sets (P. Hellekalek and G. Larcher, eds.), Lecture Notes in Statistics, vol. 138, Springer-Verlag, New York, 1998, pp. 109–166, *MR* 2000b:65007, *ZM* 990.18504.

[80] F. J. Hickernell and H. S. Hong, *Computing multivariate normal probabilities using rank-1 lattice sequences*, Proceedings of the Workshop on Scientific Computing (Hong Kong) (G. H. Golub, S. H. Lui, F. T. Luk, and R. J. Plemmons, eds.), Springer-Verlag, Singapore, 1997, pp. 209–215, *MR* 1 729 661, *ZM* 922.65099.

[81] K. T. Fang, F. J. Hickernell, and P. Winker, *Some global optimization algorithms in statistics*, Operations Research and Its Applications (D. Z. Du, Z. S. Zhang, and K. Cheng, eds.), Lecture Notes in Operations Research, vol. 2, World Publishing Corp., Beijing, 1996, pp. 14–24.

[82] K. T. Fang and F. J. Hickernell, *The uniform design and its applications*, Bull. Inst. Internat. Statist., 50^{th} Session, Book 1 (1995), 333–349.

[83] F. J. Hickernell, *A comparison of random and quasirandom points for multidimensional quadrature*, Monte Carlo and Quasi-Monte Carlo Methods in Scientific Computing (H. Niederreiter and P. J.-S. Shiue, eds.), Lecture Notes in Statistics, vol. 106, Springer-Verlag, New York, 1995, pp. 213–227, *MR* 1 445 789, *ZM* 831.65023.

[84] R. H. Elderkin, D. P. Berkowitz, F. A. Farris, C. F. Gunn, F. J. Hickernell, S. N. Kass, F. I. Mansfield, and R. G. Taranto, *On the steady state of an age dependent model for malaria*, Nonlinear Systems and Applications: An International Conference (V. Lakshmikantham, ed.), Academic Press, New York, 1977, pp. 491–512, *MR* 58 #4446.

Edited Volumes

[85] K. T. Fang, F. J. Hickernell, and H. Niederreiter (eds.), *Monte Carlo and quasi-Monte Carlo methods 2000*, Springer-Verlag, Berlin, 2002, *MR* 2003i:65006, *ZM* 0980.00040.

[86] F. J. Hickernell and H. Woźniakowski (eds.), *Special issue on the complexity of multivariate problems*, J. Complexity, vol. 17, no. 4, Academic Press, Orlando, FL, December 2001, *MR* 1 881 659, *ZM* 993.00035.

[87] T. W. Anderson, K. T. Fang, and I. Olkin (eds.), *Multivariate analysis and its applications*, Lecture Notes – Monograph Series, vol. 24, Institute of Mathematical Statistics, Hayward, California, 1994, F. J. Hickernell, (managing ed.), *MR* 98e:62010.

Other Publications

[88] S. B. Damelin and F. J. Hickernell, *Energy and discrepancy as designs for numerical computation*, Proc. 2007 International Conference on Computational and Mathematical Methods in Science and Engineering (B. A. Wade, ed.), 2007, pp. 143–147.

[89] K. T. Fang and F. J. Hickernell, *Comment on experimental design and observation for large systems, by R. A. Bates et. al.*, J. Roy. Statist. Soc. B **58** (1996), 103.

[90] M. K. Chan, M. J. Li, F. J. Hickernell, S. J. Hu, S. K. Ng, H. M. Ngai, C. C. Barnett, and W. M. Holmes, *Simulation studies of the automatic control of a blast furnace process*, Proc. 1988 Summer Computer Simulation Conference (Seattle, WA), 1988, pp. 881–885.

[91] F. Hickernell and W. Proskurowski, *Teaching calculus with computers at USC*, SIAM News **18** (1984), no. 5, 16.

[92] F. J. Hickernell, *The effect of the structure and composition of zinc oxide films on their elastic properties*, Proc. 1977 IEEE Ultrason. Symp., 1977, pp. 309–312.

Manuscripts Under Review

[93] B. Niu and F. J. Hickernell, *Monte Carlo simulation of stochastic integrals when the cost of function evaluation is dimension dependent*, 2009, submitted for publication.

[94] M. Ai and F. J. Hickernell, *Universal optimality of net and lattice designs*, 2008, submitted for publication.

[95] S. Damelin, F. J. Hickernell, D. L. Ragozin, and X. Y. Zeng, *On energy, discrepancy and group invariant measures on measurable subsets of Euclidean space*, 2008, submitted for publication.

[96] F. J. Hickernell, K. I. Liu, and K. Feng, *Digital net designs*, 2004, submitted for publication.

[97] M. N. Wong, F. J. Hickernell, and K. I. Liu, *Computing the trace of a function of a sparse matrix via Hadamard-like sampling*, 2004, submitted for publication.

[98] F. J. Hickernell, P. Kritzer, F. Y. Kuo, and D. Nuyens, *Weighted compound integration rules with higher order convergence for all N*, submitted for publication.

Manuscripts in Preparation

[99] X. Y. Zeng, J. T. Ma, D. Li, and F. J. Hickernell, *Chebyshev spectral methods on lattices for high-dimensional partial differential equations*, 2008, in preparation.

[100] K. T. Fang and F. J. Hickernell, *Uniform experimental designs*, 2007, in preparation.

[101] X. Y. Zeng, R. X. Yue, and F. J. Hickernell, *A new quadrature using integration lattices*, 2007, in preparation.

Ongoing Research

This indicates my research plan for the coming couple of years.

[R1] Uniform designs, i.e. experimental designs based on low discrepancy sets, and their relationship to optimal and orthogonal designs

[R2] Methods for solving high dimensional linear problems using lattices and net designs

[R3] Applications of quasi-Monte Carlo methods to finance and other kinds of problems

Selected Invited Talks at International Conferences

including where the results reported were published

[T1] *Breaking the Curse of Dimensionality with Lattice Designs*, Special Session on Mathematical Modeling and Numerical Methods, AMS Fall Central Section Meeting, Chicago, October 5, 2007.

[T2] *Energy and Discrepancy as Criteria for Designs for Numerical Computation, Part 1*, Special Session on Approximation in High Dimensions, Seventh International Conference on Computational and Mathematical Methods in Science and Engineering, Chicago, June 20–23, 2007 [95, 88].

[T3] *Tractability of Linear Multivariate Problems in the Average Case Setting*, Special Session on Tractability of Multivariate Problems, Seventh International Conference on Monte Carlo and Quasi-Monte Carlo Methods, August 14–18, 2006 [63].

[T4] *Optimal Points for High Dimensional Problems*, Mini-Symposium on Optimal Points and Shapes for Numerical Computation, SIAM Annual Meeting, July 10–14, 2006.

[T5] *Kai-Tai Fang's Contributions to Quasi-Monte Carlo Methods*, International Conference on Statistics in Honour of Professor Kai-Tai Fang's 65^{th} Birthday, Hong Kong, June 20–24 2005.

[T6] *Solving High Dimensional Numerical Problems*, Midwest Numerical Analysis Conference, University of Iowa, Iowa City, May 20–22, 2005, [67].

[T7] *Fast Spline Algorithms Using Low Discrepancy Point Sets*, Fifth IMACS Seminar on Monte Carlo Methods, Tallahassee, May 16-20, 2005, [67].

[T8] *Experimental Design, Coding Theory and Reproducing Kernel Hilbert Spaces*, International Congress of Chinese Mathematicians, Hong Kong, December 17–22, 2004.

[T9] *Error Analysis of Numerical Integration — Hilbert is Helpful but Banach is Better*, Modern Computational Methods in Applied Mathematics, Bedlewo, Poland, June 14–19, 2004.

[T10] *Experimental Designs Using Digital Nets with Small Numbers of Points*, Special Session on Highly-Uniform Point Sets, Sixth International Conference on Monte Carlo and Quasi-Monte Carlo Methods in Scientific Computing, Juan-les-Pins, Cote d'Azur, France, June 7–10, 2004, [96].

[T11] *Spline Methods for Solving High Dimensional Problems*, Special Session on the Tractability of Multivariate Integration, Sixth International Conference on Monte Carlo and Quasi-Monte Carlo Methods in Scientific Computing, Juan-les-Pins, Cote d'Azur, France, June 7–10, 2004, [67].

[T12] *Accurate Methods for Evaluating Multidimensional Integrals*, International Conference on Mathematics and its Applications in Honour of Roderick Wong's 60th Birthday, City University, May 28–31, 2004.

[T13] *Optimality and Robustness of Net Designs*, Workshop on Experimental Design, Institute of Statistical Science, Academia Sinica, Taipei, December 22–24, 2003, [96].

[T14] *Enhancing the Accuracy of Quasi-Monte Carlo Methods*, Mini-Symposium on Quasi-Monte Carlo Methods, Fifth International Congress on Industrial and Applied Mathematics, Sydney, Australia, July 7–11, 2003, [12].

[T15] *Tractability of Integration Using Lattices and Digital Nets*, Mini-Symposium on Tractability of Multivariate Problems, Fifth International Congress on Industrial and Applied Mathematics, Sydney, Australia, July 7–11, 2003 [70].

[T16] *Low to High Accuracy Integration of Non-Periodic Functions Based on Lattice Sampling*, Special Session on the Tractability of Multivariate Integration, Fifth International Conference on Monte Carlo and Quasi-Monte Carlo Methods in Scientific Computing, Singapore, November 25–28, 2002, [70, 99].

[T17] *An Algorithm-Driven Approach to Error Analysis for Multidimensional Integration*, Foundations

of Computational Mathematics, Institute of Mathematics and Its Applications, University of Minnesota, August 5–14, 2002, [4].

[T18] *Existence of Good Extensible Rank-1 Lattices*, Numerical Integration and Its Complexity, Oberwolfach, Germany, November 18–24, 2001, [18].

[T19] *Quasi-Monte Carlo Sampling for Integration and Simulation in Statistics Problems*, Special Session on Quasi-Monte Carlo Methods, Fifth International Chinese Statistical Association (ICSA) International Conference, Hong Kong, August 17–19, 2001.

[T20] *Optimal Quadrature of Multivariate Haar Wavelet Series*, International Conference of Computational Harmonic Analysis, Hong Kong, June 4–8, 2001, [15].

[T21] *When Is $O(N^{-2+\epsilon})$ Convergence Obtainable for Lattice Quadrature Rules?*, Special Session on the Tractability of Multivariate Integration, Fourth International Conference on Monte Carlo and Quasi-Monte Carlo Methods in Scientific Computing, Hong Kong, November 27 – December 1, 2000, [74].

[T22] *The Price of Pessimism in Multidimensional Integration*, Workshop on the Computational Complexity of Multivariate Problems, Hong Kong, October 4–8, 1999, [26].

[T23] *Error Decay Rates for Quasi-Monte Carlo Quadrature*, Mini-Symposium on Quasi-Monte Carlo Methods, Fourth International Congress on Industrial and Applied Mathematics, Edinburgh, Scotland, July 5–9, 1999, [33].

[T24] *Randomized Quasi-Monte Carlo*, Workshop on Applied Probability (Financial Mathematics and Stochastics), Hong Kong, May 31 – June 4, 1999, [75].

[T25] *What Affects the Accuracy of Quasi-Monte Carlo Quadrature?*, Third International Conference on Monte Carlo and Quasi-Monte Carlo Methods in Scientific Computing, Claremont, CA, USA, June 22–26, 1998, [78].

[T26] *Measures of Quality for Uniform Designs*, Workshop on Experimental Design, Hong Kong, May 24, 1997, [35].

[T27] *Quadrature Error Bounds and Figures of Merit for Quasi-random Points*, Workshop on Quasi-Monte Carlo Methods and Their Applications, Hong Kong, December 13–15, 1995, [46].

Selected Grants

The publication list for each grant is not complete. It only includes those publications for which I am an author or co-author.

[G1] F. J. Hickernell (PI), *Multiscale Math and Optimization for Complex Systems*, Department of Energy, US$188,229, anticipated September, 2009, a collaboration with Mihai Anitescu (Argonne National Laboratories), John R. Birge (University of Chicago), and Paul D. Hovland (Argonne National Laboratories).

[G2] J. Duan, G. E. Fasshauer, F. J. Hickernell, S. Li, and X. Li (PI) *Scientific Computing Research Environments for the Mathematical Sciences at IIT*, NSF-DMS-0923111, US$97,900, anticipated August, 2009.

[G3] G. E. Fasshauer and F. J. Hickernell (PI), *Fast and Accurate High Dimensional Function Approximation*, NSF-DMS-0713848, US$244,000, awarded July 2007, partially supported [1, 2, 93, 98].

[G4] F. J. Hickernell, *Algorithms and Tractability for Multivariate Approximation*, FRG/03-04/II-49, HK$110,000, RGC/HKBU/2009/04P, HK$318,000, completed August 2005, partially supported [1, 67, 99].

[G5] F. J. Hickernell, *Construction of Low Discrepancy Sequences*, RGC/HKBU/2007/03P, HK$486,000, ongoing, completed February 2005, [7, 8, 66, 67, 68, 71, 3, 96].

[G6] F. J. Hickernell, *Minimum Generalized Aberration Experimental Designs*, FRG/02-03/II-37, HK$154,224, completed August 2005, partially supported [8, 66, 65, 3, 96].

[G7] F. J. Hickernell, W. Y. Cheng, Y. K. Cheng, B. Hu, L. Liao, J. Liu, K. P. Ng, L. H. Tang, T. Tang, and X. Wu, *Learning Computational Science on a Parallel Architecture*, TDSG/02-03/04, HK$3,000,000, completed December 2005.

[G8] F. J. Hickernell, *Higher Accuracy Methods for Multidimensional Quadrature*, FRG/00-01/II-62, HK$196,400, and RGC/HKBU/2020/02P, HK$564,000, completed February 2005, partially supported [10, 11, 12, 13, 14, 16, 17, 65, 69, 70, 73, 4, 1].

[G9] F. J. Hickernell and T. Tang, *Spectral Methods Using Arbitrary Lattices: A Preliminary Study*, FRG/99-00/I-45, HK$38,000, completed September 2002, partially supported [73, 99].

[G10] F. J. Hickernell, *Low Discrepancy Sampling on a Finite Grid*, FRG/99-00/II-65 & FRG/01-02/I-20, HK$171,500, completed September 2002, partially supported [97].

[G11] K. T. Fang, F. J. Hickernell and L. Y. Chan, *Connections Among Orthogonal, Optimal and Uniform Designs*, RGC/HKBU/2029/99E, HK$331,000, completed December 2004, partially supported [21, 23, 31].

[G12] F. J. Hickernell, *An Integrated Approach to Experimental Designs*, FRG/99-00/II-01, HK$141,500, completed March 2001, partially supported [21, 23, 31].

[G13] F. J. Hickernell, *The Computational Complexity of Multidimensional Quadrature*, FRG/97-98/II-99, HK$179,000, completed March 31, 2001, and RGC/HKBU/2030/99P, HK$405,000, completed August 2002, partially supported [12, 15, 16, 17, 18, 19, 20, 24, 26, 27, 29, 33, 69, 74, 75, 77, 4, 97].

[G14] K. T. Fang and F. J. Hickernell, *The Robustness and Efficiency of Experimental Designs for Complex Systems — A Study of the Uniform Design*, RGC/97-98/47, HK$435,600, completed September 2000, partially supported [22, 25, 28, 33, 34, 78].

[G15] F. J. Hickernell, *The Generation and Application of Good Lattice Point Sequences*, FRG/96-97/II-67, HK$162,992, completed February 2000, partially supported [30, 32, 33, 78, 79].

[G16] F. J. Hickernell, K. T. Fang and L. Z. Liao, *Quasi-Monte Carlo Methods for Scientific Computing*, FRG/95-96/II-01, HK$190,000, completed July 1998, partially supported [35, 37, 39, 43, 45, 80].

[G17] K. T. Fang and F. J. Hickernell, *Some Problems in Non-Normal and Non-Linear Multivariate Statistics*, RGC/94-95/38, HK$303,000, completed September 1997, partially supported [35, 38, 39, 41, 43, 44, 45, 81, 82, 83, 89].

[G18] K. T. Fang, F. J. Hickernell, P. C. B. Lam and K. W. Ng, *Number-Theoretic Methods in Statistics and Their Applications*, RGC/91-92/04, HK$345,000, completed December 1993, partially supported [46, 47, 48, 49].

Research Centres and Institutes

2003–2004	Director, High Performance Cluster Computing Centre Supported by Dell and Intel, Hong Kong Baptist University
2001–2004	Director, Peking University – Hong Kong Baptist University Joint Research Institute for Applied Mathematics
1992–2004	Member, Statistics Research and Consultancy Centre Hong Kong Baptist University

Professional and Community Service

Examining, Refereeing, and Editorial Work

Associate Editor, *Journal of Complexity*, 1999–present; one of two judges chosen to select the Best Paper Award for 2002

Associate Editor, *International Journal of Numerical Analysis and Modeling*, 2003–present

Associate Editor, *Mathematics of Computation*, 2008–present

Associate Editor, *SIAM Journal on Numerical Analysis*, 2005–present

Corresponding Editor, *Institute of Mathematical Statistics Bulletin*, 1992–2001

External examiner for MPhil and PhD theses at other universities

Referee for research grant proposals to national funding agencies in various countries

Referee for various journals, including, *ACM Trans. Model. Comput. Simul.*, *Ann. Inst. Statist. Math.*, *Ann. Statist.*, *Math. Comp.*, *Math. Comput. Modelling*, *SIAM J. Numer. Anal.*, *SIAM J. Sci. Comput.*, *SIAM Rev.*

Reviewer for Mathematical Reviews, 2001–present

Leadership in Professional and Service Organizations

International Christian School (ICS) Parent Association Chairman, 2002–2004, Executive Committee Member, 2001–2004; Member of the ICS School Management Committee, 2002–2004; Member of the ICS Headmaster Search Committee, 2002

Hong Kong Professional and Educational Services Board Member, 1991–2005, Chairman of the Board, 2001–2003

Hong Kong Meteorological Society Executive Committee Member, 1989–1992

Hong Kong Mathematical Society Membership Secretary, 1988–1990

Advisor, United Christian College (Kowloon East), 2003–2004

Conference Organization

Program Committee Member, biennial *International Conference on Monte Carlo and Quasi-Monte Carlo Methods in Scientific Computing*, 1998–2008, Organizing Committee Co-Chair, 2000, Steering Committee Member, 2006–present

Scientific Committee Member, *Seventh International Conference on Computational and Mathematical Methods in Science and Engineering*, Chicago, 2007

Co-Chair, Scientific Committee, *International Conference on Statistics in Honour of Professor Kai-Tai Fang's 65^{th} Birthday*, Hong Kong, 2005

Program Committee Member, *Fifth IMACS Seminar on Monte Carlo Methods*, Florida, 2005

Organizing Committee Member, *International Congress of Chinese Mathematicians*, Hong Kong, 2004

Conference Committee Member and Organizing Committee Chair, *International Conference on Scientific Computing and Partial Differential Equations*, Hong Kong, 2002

Special session organizer, *Fifth International Chinese Statistical Association (ICSA) International Conference*, Hong Kong, 2001

Organizing Committee Member, *Foundations of Computational Mathematics Fall 1999 Semester* in Hong Kong; Co-organizer, *Workshop on the Computational Complexity of Multivariate Problems*, Hong Kong, 1999

Local Organizing Committee Chairman, *International Symposium on Contemporary Multivariate Analysis and Its Applications*, Hong Kong, 1997

Co-organizer, *Workshop on Quasi-Monte Carlo Methods and Their Applications*, Hong Kong, 1995

International Organizing Committee Member and Local Organizing Committee Member, *Second International Conference on East Asia and Western Pacific Meteorology and Climate*, Hong Kong, 1992

Local Organizing Committee Vice-Chairman, *International Symposium on Multivariate Analysis and Its Applications*, Hong Kong, 1992

Local Organizing Committee Member, *Asian Mathematical Conference*, Hong Kong, 1990

Illinois Institute of Technology Service

Chair, Computer Science Chair Search Committee, 2005–2007

Member, Research Center review committee, 2007

Member, Provost Search Committee, 2007–2008

Member, Sigma Xi Research Awards selection committee, 2008

Hong Kong Baptist University Service

Council standing committees: Campus Development, Personnel

Senate (formerly Academic Board) and its standing committees: Academic Development, Academic & Professional Standards, Academic Rules & Regulations (chair, member), Christian Activities, Research, Student Affairs

University standing committees: Staff Affairs, Information Technology, Promotion Panel

Various university ad hoc committees and working groups, including: Academic Staff Performance Management Task Group, Centre for Educational Development Review Panel, Committee on Termination of Appointment, Internationalization Committee, Internationalization Advisory Committee, Panel to Review a Dispute Involving the Religion & Philosophy Department and a Staff Member, Search Committee for the Vice-President for Development, Student Activities Fund Disbursement Panel, Student Disciplinary Panel, Working Group on Self-Funded Courses (chair), Working Group on Senate Standing Committee Memberships, Zero-Based Budgeting Committee

Course boards: BSc Combined Sciences, MSc Scientific Computing

Science Faculty standing committees: Academic Administrative, Computing (chair), Projects, Research Specialist Panel (deputy chair, member), Staff Development Resources