

### PROF. MOURAD E.H. ISMAIL – BIOGRAPHICAL DATA

**Personal data:** Born April 27, 1944, in Cairo, Egypt.

Canadian and Egyptian citizen, permanent resident in the United States

**Education:**

Ph.D. 1974 (Alberta), M.Sc. 1969 (Alberta), B.Sc. 1964 (Cairo).

**Affiliation:** Department of Mathematics, University of Central Florida,  
Orlando, FL 32816 - USA

**Web-page:** <http://shell.cas.usf.edu/~ismail/>

**Research Interests:** approximation theory, asymptotics, combinatorics,  
integral transforms and operational calculus, mathematical physics,  
orthogonal polynomials and special functions.

**Editorial Boards:**

1. *Constructive Approximation*, Springer-Verlag, 1988 - present.
2. *Encyclopedia of Mathematics*, Cambridge University Press, 1992 - present.
3. *Journal of Approximation Theory*, formerly published by Academic Press and now by Elsevier, 2000 - present.
4. *Journal of Physics A: Mathematical and General*, 2001-2004.
5. *The Ramanujan Journal*, formerly published by Kluwer and now by Springer-Verlag, 1996 - present.
6. *Methods and Applications of Analysis*, International Press, 1992-1999.
7. *International Journal of Mathematics and Mathematical Sciences*, 1993 - 2008.
8. *J. of Computational Analysis and Applications*, Plenum, 1998 - 2008.
9. *The Indian Journal of Mathematics*, 1997 - present.
10. *Fractional Calculus and Applied Analysis*, 1998 - present.
11. *The Egyptian Journal of Mathematics*, 2003 - present.
12. Collaborating Problem Editor, *American Math. Monthly*, 1992-1997.

**Honors and Awards:**

- Undergraduate Merit Scholarship, Cairo University 1960-1964;
- Dissertation Fellowship, University of Alberta, 1973-1974;
- Theodore and Venette Askounes-Ashford Distinguished Scholar Award  
University of South Florida, 1992-1993;
- Leverhulme research fellow, Imperial College, London, 1996;
- University visiting research professorship, City University of Hong Kong,  
2000-2001;
- USF Presidential Excellence Award (= 10 % raise), 2003;
- Listed among the highly cited: *www.isihighlycited.com* ;
- Elected fellow of the Institute of Physics, December 2004;
- Elected fellow of the European Society of Computational Mathematics  
in Science and Engineering.

**Visiting Positions:**

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|-----------|--|
| 2009      | Visiting member, The Isaac Newton Institute, University of<br>Cambridge, UK                |
| 2008      | Von Neumann Professor, the Technical University of Munich,<br>Munich, Germany, June & July |
| 2008      | Visiting Scholar, Hong Kong U of Sc. and Tech., May & June                                 |
| 2006      | Visiting Scholar, City University of Hong Kong, May & June                                 |
| 2002      | Visiting Scholar, Hong Kong U of Sc. and Tech., May & June                                 |
| 2000-2001 | Visiting university professor, City University of Hong Kong                                |
| 1999      | Visiting member, Mat. Sc. Res. Inst., Berkeley, three months                               |
| 1996      | Visiting Professor and Leverhulme research fellow,<br>Imperial College, London             |
| 1990-1991 | Adjunct Professor, University of Toronto   |
| 1990      | Visiting Professor, University of Paris VII<br>(10 weeks in the summer)                    |
| 1988      | Visiting Professor, National University of Colombia<br>(1 month)                           |
| 1987-1990 | Adjunct Professor, York University   |
| 1987      | Visiting Professor, University of Alberta<br>(1 month in the summer)                       |
| 1986      | Visiting Professor, University of Paris VII<br>(10 weeks in the summer)                    |
| 1984-1985 | Visiting Professor, University of Minnesota, Minneapolis                                   |
| 1982      | Visiting Professor, Kuwait University<br>(winter and summer semesters)                     |

- 1976 Visiting Scholar, Mathematics Research Center  
University of Wisconsin, Madison
- 1975-1976 Visiting Lecturer and Research Associate, University of Toronto
- 1974-1975 Assistant Scientist, Department of Mathematics  
Research Center, University of Wisconsin, Madison

**Master's Students:**

1. Richard Ruedemann, Arizona State University, August 1987.  
Thesis title: "*Positivity Results in Combinatorics*".
2. Ruiming Zhang, Arizona State University, August 1987.  
Thesis title: "*The Hellmann-Feynman Theorem and Zeros of Special Functions*".
3. David Milligan, University of South Florida, December 1997,  
Thesis title: "*How Mathematics Aids Engineering and Engineering stimulates Mathematics and an Example Involving Fuel Spray*".
4. David Wallace, University of Central Florida, July 2005,  
Thesis title: "*The Hellmann-Feynman Theorem*".

**Doctoral Students:**

1. Edward Bank, Arizona State University, April 1984.  
Dissertation title: "*Pollaczek Polynomials and Functions*".
2. Jairo Charris, Arizona State University, August 1984.  
Dissertation title: "*Sieved Pollaczek and Random Walk Polynomials*".
3. Li-Chen Chen, University of South Florida, August 1989.  
Dissertation title: "*On Asymptotics of Certain Hypergeometric Functions and  $6 - j$  Symbols*".
4. Richard Ruedemann, University of South Florida, August 1992.  
Dissertation title: "*Relation Between Polynomials Orthogonal on the Unit Circle With Respect to Different Weights*".
5. Ruiming Zhang, University of South Florida, April 1993.  
Dissertation title: "*Some Formulas of W. Gosper and Spectral Properties of Certain Operators in Weighted Spaces*".
6. Jifeng Ma, University of South Florida, May 1997.  
Dissertation title: "*Spectrum of Some Integral Operators*".
7. Zeinab Mansour, Co-supervisor with Mahmoud Annaby, Cairo University, January 2006. Dissertation title: "*q-Difference Equations*".
8. Jemal Gishe, University of South Florida, July 2006.  
Dissertation title: "*A Finite Family of q-Orthogonal Polynomials and Resultants of Chebyshev Polynomials*".
9. Daniel J. Gallifa, University of Central Florida, May 2009. Diss. title: "*The Sheffer B-Type 1 Orthogonal Polynomial Sequences*".

**LIST OF PUBLICATIONS:****Books**

1. *Mathematical Analysis, Wavelets, and Signal Processing*, Proceedings of an International Conference on Mathematical Analysis and Signal Processing, coeditor with M. Z. Nashed, A. I. Zayed and A. F. Ghaleb, Contemporary Mathematics, volume 190, AMS, Providence, 1995.
2. *Special Functions,  $q$ -Series and Related Topics*, coeditor with D. Masson and M. Rahman, Fields Institute Communications, volume 14, AMS, Providence, 1997.
3.  *$Q$ -Series from a Contemporary Perspective*, coeditor with D. Stanton, Contemporary Mathematics, volume 254, AMS, Providence, 2000.
4. *Special Functions*, coeditor with C. F. Dunkl and R. Wong, World Scientific, Singapore, 2000.
5. *Special Functions 2000, Current Perspectives and Future Directions*, coeditor with J. Bustoz, and S. K. Suslov, Kluwer, Dorchester, 2001.
6. *Symbolic Computation, Number Theory, Special Functions, Physics and Combinatorics 2001*, Coeditor with F. G. Garvan, Developments in Mathematics, Volume 4, Kluwer, Dorchester, 2001.
7. *Theory and Applications of Special Functions: A Volume Dedicated to Mizan Rahman*, Coeditor with H. Koelink, Developments in Mathematics, Springer+Business Media, New York, 2005.
8. *Classical and Quantum Orthogonal Polynomials in one Variable*, Cambridge University Press, 2005.

**Special Issues**

1. *Special Issue Dedicated to R. Askey and F. W. J. Olver*, coeditor with G. Andrews, G. Gasper, and P. Nevai, SIAM J. Math. Anal., volume 25, number 2 (1994), pp. 243–814.
2. *Special Volume on  $q$ -Series*, coeditor with D. Masson, J. Comp. Appl. Math. 68 (1996), 339 pages.
3. *Special Issues of Methods and Applications of Analysis*, coeditor with D. Stanton, volume 5, 1999.
4. *Special Issue of the Rocky Mountain J. Math.*, coeditor with J. Bustoz and S. Suslov, volume 32, number 2 (2002), 389–936.

### Papers

*Only a selected part of the recent years, of all more than 250 items starting from years 1973-1974. Some of these articles are invited papers, addresses and special presentations at international conferences*

1. The spectrum of an integral operator on weighted  $L_2$  space, joint with P. Simeonov, Pacific J. Math. 198 (2001), pp. 443-476.
2. Orthogonality and completeness of Fourier type systems, Z. Anal. Anwendungen 20 (2001), pp. 761-775.
3. Ted Chihara and his work on orthogonal polynomials, joint with R. Askey and W. Van Assche, J. Comp. Appl. Math. 133 (2001), pp. 1-11.
4. Lectures on  $q$ -orthogonal polynomials, in "Special Functions 2000", J. Bustoz, M.E. H. Ismail, and S. K. Suslov, eds, Kluwer, Dorchester, 2001, pp. 179-219.
5. Some orthogonal polynomials related to elliptic functions, joint with G. Valent and G. Yoon, J. Approx. Theory 112 (2001), pp. 251-178.
6. An operator calculus for the Askey-Wilson operator, Annals of Combinatorics 5 (2001), pp. 333-348.
7. Inverse operators,  $q$ -fractional integrals and  $q$ -Bernoulli polynomials, joint with M. Rahman, J. Approx. Theory, 114, (2002) pp. 269-307.
8.  $q$ -integral and moment representations for  $q$ -orthogonal polynomials, joint with D. Stanton, Canadian J. Math. 54 (2002), pp. 709-735.
9. Complex oscillation theory and special functions, joint with Y. M. Chiang, Math. Rep. Royal Soc. Canada 24 (2002), pp. 117-123.
10. Small eigenvalues of large Hankel matrices: The indeterminate case, joint with C. Berg and Y. Chen, Math. Scand. 91 (2002), pp. 67-81.
11. An inverse to the Askey-Wilson operator, joint with M. Rahman, Rocky Mountain J. Math. 32 (2002), pp. 657-678.
12. A fourth order  $q$ -difference equation for associated discrete  $q$ -orthogonal polynomials, joint with P. Simeonov, Rocky Mountain J. Math. 32 (2002), pp. 679-790.
13. Difference equations and quantized discriminants for  $q$ -orthogonal polynomials, Advances in Applied Mathematics 30 (2003), pp. 562-589.
14. Applications of  $q$ -Taylor theorems, joint with D. Stanton, J. Comp. Appl. Math. 153 (2003), pp. 259-272.
15. Tribasic Integrals and identities of Rogers-Ramanujan type, joint with D. Stanton, Trans. Amer. Math. Soc. 355 (2003), pp. 4061-4091.
16. Three routes to the exact asymptotics for the one-dimensional quantum walk, joint with H. A. Carteret and L. B. Richmond, J. Phys. A 36 (2003), pp. 8875-8895.

17.  $q$ -Taylor theorems, polynomial expansions, and interpolation of entire functions, joint with D. Stanton, *J. Approx. Theory* 123 (2003), pp. 125–146.
18. A generalization of a theorem of Bochner, *J. Computational and Appl. Math.* 159 (2003), pp. 319–324.
19. A  $q$ -analogue of the Whittaker-Shannon-Kotel'nikov sampling theorem, joint with A. Zayed, *Proc. Amer. Math. Soc.* 131 (2003), pp. 3711–3719.
20. Application of upper and lower bounds for the domination number to Vizing's conjecture, joint with W. E. Clark and S. Suen, *ARS Combinatoria* 69 (2003), pp. 97–108.
21. Lectures on orthogonal polynomials, in *Differential Equations & Asymptotic Theory in Mathematical Physics*, C. Hua and R. Wong, eds, World Scientific, Singapore, 2004, pp. 1–43.
22. Difference equations and discriminants for discrete orthogonal polynomials, joint with I. Nikolova and Simeonov, *the Ramanujan Journal* 8 (2004), pp. 475–502.
23. Jacobi polynomials from compatibility conditions, joint with Y. Chen, *Proc. Amer. Math. Soc.* 133 (2004), pp. 465–472.
24. New proofs of some  $q$ -series results, joint with R. Zhang, in *Theory and Applications of Special Functions*, edited by M. E. H. Ismail and H. Koelink, Springer+Business Media, New York, 2005, pp. 285–299.
25. Mizan Rahman, his mathematics and literary writings, joint with R. Askey and E. Koelink, in *Theory and Applications of Special Functions*, edited by M. E. H. Ismail and H. Koelink, Springer+Business Media, New York, 2005, pp. 1–28.
26. Asymptotics of  $q$  orthogonal polynomials and a  $q$ -Airy function, *IMRN* (2005), 2005 18 (2005), pp. 1063–1088.
27. Determinants with orthogonal polynomial entries, *J. Comp. Appl. Math.* 178 (2005), pp. 255–266.
28. Completely monotonic functions involving the Gamma and  $q$ -Gamma functions, joint with A. Z. Grinshpan, *Proc. Amer. Math. Soc.* 134 (2005), pp. 1153–1160.
29. A moment problem and a family of integral evaluations, joint with J. Christiansen, *Trans. Amer. Math. Soc.* 358 (2006), pp. 4071–4097.
30. On formulas of Ramanujan and Evans, *the Ramanujan Journal*, 11 (2006), pp. 349–353
31. Differential equations of orthogonal matrix polynomials, joint with A. Duran, *J. Comput. Appl. Math.* 190 (2006), pp. 424–436.

32. Functional inequalities for incomplete gamma and related functions, joint with A. Laforgia, *Mathematical Inequalities & Applications*, 9 (2006), pp. 299–302.
33. Ramanujan continued fractions via orthogonal polynomials, joint with D. Stanton, *Advances in Math.* 203 (2006), pp. 170–193.
34. On value distribution theory of second order periodic ODES, special functions and orthogonal polynomials, joint with Y. M. Chiang, *Canadian J. Math.* 58 (2006), pp. 726–767.
35. Chaotic and periodic asymptotics for  $q$ -orthogonal polynomials, joint with R. Zhang, *IMRN*, Article ID 83274, (2006), pp. 1–33.
36. Orthogonal polynomials and Ramanujan's  $q$ -continued fractions, joint with X. Li, *Electronic Transactions on Numerical Analysis*, 25 (2006), pp. 158–165.
37. Scaled asymptotics for  $q$ -polynomials, joint with R. Zhang, *Comptes Rendus Acad. Sc. France*, 344 (2007), pp. 71–75.
38. Monotonicity properties of Determinants of Special functions, joint with A. Laforgia, *Constructive Approximation* 26 (2007), pp. 1–9.
39. Generalizations of Chebyshev polynomials and Polynomial Mappings, joint with Y. Chen and J. Griffin, *Transactions Amer. Math. Soc.* 359 (2007), pp. 4787–4828.
40. Zeros of entire functions and a problem of Ramanujan, joint with C. Zhang, *Advances in Math.* 209 (2007), 363–380.
41. Asymptotics of zeros of certain entire functions, *Analysis and Its Applications*, 5 (2007), pp. 291–299.
42. On sampling theory and basic Sturm-Liouville systems, joint with J. Bustoz and M. Annaby, *J. Comp. Appl. Math.* 206 (2007), pp. 73–85.
43. Power law eigenvalue density, scaling and critical random matrix ensembles, joint with K. Muttaib, *Phs. Rev. E* 76 (2007), 051105-1–051105-5.
44. Linear  $q$ -difference equations, joint with M.H. Abu Risha, M.H. Annaby, and Z.S. Mansour, *Z. Anal. Anwendungen* 26 (2007), pp. 481–494.
45. Inequalities and asymptotics for a terminating  ${}_4F_3$  series, joint with P. Simeonov, *Illinois J. Math.* 51 (2007), pp. 861–881.
46. Functions whose moments form a geometric progression, joint with X. Li, *Topics in Classical Analysis and Applications in Honor of Daniel Waterman*, World Scientific, Singapore, 2008, pp. 110–117.
47. Resultants of Chebyshev polynomials, joint with J. Gishe, *Z. Anal. Anwendungen* 27 (2008), pp. 491–500
48. Ladder operators for  $q$ -orthogonal polynomials, joint with Y. Chen, *J. Math. Anal. Appl., J. Math. Anal. Appl.* 345 (2008), pp. 1–10.

49. Structure relations for orthogonal polynomials, *Pacific J. Math.* 240 (2009), pp. 309–319.
50.  $q$ -Difference operators for orthogonal polynomials, joint with P. Simonov, *J. Comp. Appl. Math.* 233 (2009), 749–761.
51. One parameter generalizations of the Fibonacci and Lucas numbers, *Fibonacci Quarterly* 46-47 (2009), 167–180.
52. Orthogonal polynomials, their recursions, and functional equations, in “Symmetry and Integrability of Difference Equations, D. Levi, P. Olver, Z. Thomova, and P. Winternitz, ed., *London Math. Soc. Lecture Notes*, Cambridge Univ. Press, Cambridge, 2010, to appear.
53. Two discrete systems of  $q$ -orthogonal polynomials, in “Differential Algebra, Complex Analysis, and Orthogonal Polynomials”, ed. by P. Agosta-Humaney and F. Marcellan, *Contemporary Mathematics*, volume 509, AMS, Rhode Island, pp. 95–102.
54. Addition theorems via continued fractions, joint with J. Zeng, *Trans. Amer. Math. Soc.* 362 (2010), 957–983.
55. Hypergeometric origins of Diophantine properties associated with the Askey scheme, joint with Yang Chen, *Proc. Amer. Math. Soc.*, to appear.
56. Characterizations of continuous and discrete ultraspherical polynomials, joint with J. Obermaier, *Canad. J. Math.* (2010), to appear.

#### **Letter by the Editor**

Many colleagues in our field know well the “big” man and great mathematician and friend Mourad. Many of us experienced and have been impressed by his expertise in wide variety of topics, his big heart and readiness to help, advise and encourage. The same is confessed also by his numerous pupils and students.

I had many occasions to meet him personally, starting from his visits at conferences in Bulgaria, through various conferences in Arab countries (as Kuwait, Tunisia, etc) and my participation in the NATO Conference on Special Functions, at Arizona State University - USA, 2000.

Personally, and on behalf of the Editorial Board, I would like to thank Professor Mourad Ismail for his valuable service to the journal “FCAA” and to wish him on his 65th birthday good health, happiness in family and new great success in research and teaching.

**Virginia Kiryakova**, Managing Editor “FCAA”,  
*Institute of Mathematics and Informatics - Bulgarian Academy of Sciences*