
CURRICULUM VITA

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EDUCATION:

- PhD in Mathematics, University of Missouri, Columbia, 1978.

EMPLOYMENT:

- Chair, Trinity University, 2008-
- Visiting Professor, Howard University, 2005-2006.
- Professor, Trinity University, 1991-present.
- Chair, Trinity University, 1991-1999.
- Associate Professor, Trinity University, 1989-1991. Associate Professor, University of Colorado at Colorado Springs, 1984-1989. Visiting Assistant Professor, Case Western Reserve University, 1983-1984. Assistant Professor, Kuwait University, 1978-1983.
- Visiting Scholar: University of California-Berkeley (Spring 2001), University of Augsburg (Summer 2001), Birzeit University (Fall 2000), and University of Florence (Fall 1994).

RESEARCH INTERESTS:

- Difference Equations / Discrete Dynamical Systems, and Mathematical Biology.

HONORS:

- Instructor of the Year Award, College of Engineering and Applied Sciences, University of Colorado, 1988.
- Fulbright Scholar, Fall 2000.

ACADEMIC ACTIVITIES:

- *Co-Editor-in-Chief, Journal of Biological Dynamics (JBD), Taylor & Francis, 2006-*
- *Co-Editor-in-Chief, Journal of Difference Equations and Applications (JDEA), Taylor & Francis, 1994-*
- *Member of the editorial board of Journal of Computational and Applied Analysis, 1998-*
- *Member of the editorial board of CUBO, A Mathematical Journal, 1999-*
- *Editor: Book series "Advances in Discrete Mathematics and Applications", Taylor & Francis, 1995-.*

PROFESSIONAL ACTIVITIES:

- *President, International Society of Difference Equations (ISDE), 2005-*
- *Director, European Advanced Studies, 2006-*
- *Vice-Chairman, The European Committee for establishing a center of excellence in Mathematics and Theoretical Physics at Birzeit University, (ECCE-Birzeit), 2005-*
- *Vice-President, International Society of Education (ISE), 2006-*

PhD Students:

Ziyad Al-Sharawi, University of Central Michigan, PhD, May 2006.

Rafael Lluís, Technical University of Lisbon

PUBLICATIONS:**Books:**

1. *Discrete Chaos: Applications in Science and Engineering, Second Edition, Chapman & Hall / CRC London, 2008.*
2. *An Introduction to Difference Equations, Springer, New York, Third Edition, 2005.*
3. (Editor) *Difference equations, Special functions and Orthogonal Polynomials, World Scientific, 2007.*
4. (Editor) *Mathematics Research at the leading edge, NOVA 2006.*
5. (Editor) *Difference Equations and Discrete Dynamical Systems, Proceedings of the 9th International Conference, University of Southern California, World Scientific, 2005*
6. (Editor) *Difference and Differential Equations, Fields Institute Communications, American Mathematical Society, Providence, 2004.*
7. (Editor) *New Progress in Difference Equations, Chapman & Hall/CRC, Boca Raton, 2004.*
8. (Editor) *New Trends in Difference Equations, Taylor & Francis, London, 2002.*
9. (Editor) *Mathematics & Mathematics Education, World Scientific, Singapore, 2002.*
10. (Editor) *Proceedings of Mathematics Conference, World Scientific, Singapore, 2000.*
11. (Editor) *New Developments in Difference Equations and Applications, Gordon and Breach, 1999.*
12. (Editor) *Advances in Difference Equations, Gordon and Breach, 1997.*
13. (Editor) *Difference Equations and Applications, Gordon and Breach, 1995.*
14. (Editor) *Differential Equations; Stability and Control, Marcel Dekker, Inc., New York, 1990.*
15. *Dictionary of Mathematics (English-Arabic-English), Kuwait Foundation for the Advancement of Science, 1984, (with Dannan et al.) Math. Reviews, 86j:00015 (1986), P. 4396.*
16. *Encyclopedia of Mathematics, Vol. I, II, III and IV, (in Arabic), Kuwait Foundation for the Advancement of Science, 1984, (with Dannan et al.), Math Reviews, 86j:00015, P. 4396.*

Grants:

1. *USDA Grant, 2008-2013 (with Kelly Lyons).*
2. *NSF grant DMS- 0729519, 2007-2008 (With Jia Li, Shandelle Henson and Nicholas Ercolani)*
3. *NSF Grant OISE-0609974, 2006-2008.*
4. *REU-NSF Grants, DMS-9619837, 1997-2000.*
5. *Fulbright Grant, 2000.*
6. *NSF Grant, DMS-9706954, Asymptotic theory of difference equations, 1997-2000.*
7. *PEW Foundation Grant, Chaos for undergraduates, 1995.*
8. *NSF Grants, Int-9805576, 1998-1999, 2000-2001.*
9. *University of Le Havre summer Grant, France, summer 2002.*

10. Trinity University Faculty Development Grants, Summer 1990, 1995, 2003, 2007.
11. The University of Augsburg Grant, Summer 2001.

Books in progress:

1. *Discrete Mathematical Models in Life Sciences (with David Ribble).*

Papers published or accepted for publication (in refereed journals):

1. *An Economic Model with Allee effect, J. Diff. Eq. Appl, Accepted.(with R. Luis and H. Oliveira).*
2. *Stability and asymptoticity of Volterra Difference Equations: A progress report, Journal of Computational and Applied Mathematics*
3. *Existence and stability of periodic orbits of periodic difference equations with delays, International Journal of bifurcation and chaos, 18 (2008) 1-15 (with Angelos and Al-Sharawi)*
4. *On the stochastic Beverton-Holt equation with survival rates, J. Diff. Eq. Appl., Vol. 14(2008), 175-190 (with Bezandry and Diagana).*
5. *On the asymptotic stability of linear Volterra difference equations of convolution type, J. Diff. Eq. Appl., Vol. 13(12), (2007), 1079-1084 (with Messina and Vecchio.)*
6. *Population Models in almost periodic environment, J. Diff. Eq. Appl., Vol. 13(4) (2007), 239-260 (with Diagana, Yakubu).*
7. *Periodic difference equations, population biology and the Cushing-Henson conjecture, Mathematical Biosciences 201 (2006), 195-207 (with Sacker).*
8. *Skew-product dynamical systems: Applications to difference equations, NOVA 2006, Proceedings of the UAE Math Day (with Sacker).*
9. *An extension of Sharkovsky's theorem to periodic difference equations, J. Math Anal. Appl. vol. 316, (2006), 128-141 (with AlSharawi, Angelos, Rakesh).*
10. *Nonautonomous Beverton-Holt equations and the Cushing-Henson Conjectures, J. Diff. Eq. Appl. Vol. 11 (pp. 337-347), 2005.*
11. *Global stability of periodic orbits of nonautonomous difference equations in population biology and the Cushing-Henson conjectures. Proceedings of the Eighth International Conference on Difference Equations and Applications, 113--126, Chapman & Hall/CRC, Boca Raton, FL, 2005 (with Sacker).*
12. *Global stability of periodic orbits of nonautonomous difference equations and population biology, Journal of Differential Equations, Vol. 208, pp. 258-273 (2005) (with Sacker).*
13. *Difference Equations versus Differential Equations, a possible equivalence, Physica D, Vol. 195/ 1-2 (2004), pp. 29-49 (with Letellier et al).*
14. *Basin of attraction of periodic orbits of maps on the real line, J. Diff. Eq. Appl., Vol. 10(10), 881-888 (2004), (with Sacker).*
15. *Asymptotic solutions of a discrete Schrodinger equation arising from a Dirac equation with random mass, New Progress of Difference Equations, (Ed. Aulbach, Elaydi, Ladas), Chapman & Hall/CRC, 2004, 349-358 (with Aulbach, Ziegler).*
16. *Asymptotic stability of linear difference equations of advanced type, J. Computational Anal. Appl., Vol. 6, No. 2, 423-428 (2004) (with Dannan).*
17. *Nonautonomous difference equations: Open problems and conjectures, Proceedings of the 8th international conference on difference equations, The Fields Institute, 423-428 (2004).*
18. *Difference equations from discretization of continuous epidemic models with disease in the prey, Canadian Applied Math Quarterly, Vol. 11, pp. 93-101, 2003 (with Jang)*
19. *Stability of hyperbolic and non-hyperbolic fixed points of one-dimensional maps, J. Diff. Eq. and Appl. 9(2003), 449-457 (with Dannan, Ponomarenko)*

20. *Is the world evolving discretely?* *Advances in Applied Math*, 31(2003), 1-9.
21. *Poincaré-type solutions of systems of difference equations*, *J. Math. Anal. Appl.* 275 (2002), 69-83 (with Abu-Saris, Jang).
22. *Stability theory of Volterra difference equations*, *Advances in Stability Theory at the End of the 20th Century*, (ed. Martynyuk), Taylor & Francis, 2002, pp. 124-155 (with Dannan, Li).
23. *Z-transform*, *Encyclopedia of Mathematics*, (ed. Hazewinkel), Kluwer, 2002, pp. 448-449.
24. *Global stability of cycles: Lotka-Volterra competition model with stocking*, *J. Diff. Eq. and Appl.* 8 (2002), 537-549 (with Yakubu).
25. *Basin of attraction of stable cycles*, *J. Diff. Eq. and Appl.* 8 (2002), 755-760 (with Yakubu).
26. *Asymptotics for linear difference equations II: Applications*, *New Trends in Difference Equations*, Taylor & Francis, London, 2002, pp. 111-133.
27. *Discrete competitive and cooperative models of Lotka-Volterra type*, *J. Computational and Applied Analysis* 3 (2001), 53-73 (with P. Liu).
28. *The Discrete Analogue of the Putzer Algorithm*, *Linear Algebra Gems, MAA Notes*, (ed. D. Carlson et al.), 2001, pp. 249-253.
29. *Nonstandard discretization methods for some biological models*, a chapter in "Applications of nonstandard finite difference schemes," edited by R. Mickens, World Scientific Publishers, 2000.
30. *Periodic solutions of difference equations*, *J. Diff. Eq. and Appl.* 6 (2000), 203-232 (with Dannan, Liu).
31. *Extension of chaos to general topological spaces*, *Panamer. Math. J.* 10 (2000), 61-71 (with Awartani).
32. *On some open problems in difference equations*. *Proceedings of the Second Palestinian International Conference on Mathematics*, pp. 89-114, World Scientific Publications, 2000.
33. *Asymptotic for linear difference equations I: Basic Theory*, *J. Diff. Eq. and Appl.* 5 (1999), 563-589.
34. *Difference equations in combinatorics, number theory, and orthogonal polynomials*, *J. Diff. Eq. and Appl.* 5 (1999), 379-392.
35. *Asymptotic equivalence for difference equations with infinite delay*, *J. Diff. Eq. and Appl.* 5 (1999), 1-23.
36. *Recent developments in the asymptotics of difference equations*, *New Developments in Difference Equations and Applications, Proceedings*, Gordon and Breach, (1999), 161-181.
37. *Uniform asymptotic stability in linear Volterra difference equations*, *J. Diff. Eq. and Appl.* 3 (1998), 203-218 (with Murakami).
38. *Dichotomy and trichotomy of difference equations*, *J. Diff. Eq. and Appl.* 3 (1998), 417-448 (with Janglajew).
39. *On the Computation of A^N* , *SIAM Review* 40 (1998), 965-971.
40. *Stability of integrodifferential systems of nonconvolution type*, *Mathematical Inequalities and Applications* 1 (1998), 423-430.
41. *New trends in the asymptotics of difference equations*, *Proceedings of the Third International Conference on Difference Equations*, Taipei, Gordon and Breach, 1999, 161-181.
42. *Asymptotic theory for noninvertible systems*, Gordon & Breach, 1997, 155-164 (with Pappaschinopoulos, Schinas).
43. *Asymptotic stability versus exponential stability in linear Volterra difference equations of convolution type*, *J. Diff. Eq. and Appl.* 2 (1996), 401-410 (With Murakami).

44. *Global stability of nonlinear delay difference equations*, *J. Diff. Eq. and Appl.* 2 (1996), 87–96 (with Kocic, Li).
45. *On a Converse of Sharkovsky's Theorem*, *American Math. Monthly* 103 (May 1996), 386–392.
46. *An extension of Levinson's Theorem to asymptotically Jordan difference equations*, *J. Diff. Eq. and Appl.* 1 (1995), 369–390.
47. *Periodic solutions of Volterra difference equations with infinite delay II: the nonlinear case*, *Proceedings of the first International Conference on Difference Equations* (Ed. S. Elaydi et al.), Gordon and Breach, 1995, 175–183 (with Zhang).
48. *Periodic solutions of Volterra difference equations with infinite delay I: the linear case*, *Proceedings of the first International Conference on Difference Equations*, (Ed. S. Elaydi), Gordon and Breach, 1995, 163–174 (with Zhang).
49. *Asymptotic theory for delay difference equations*, *J. Diff. Eq. and Appl.* 1 (1995), 99–116 (with Gyori).
50. *Global stability of nonlinear Volterra difference systems*, *J. Differential Equations and Dynamical Systems* 2 (1994), 337–345 (with Kocic).
51. *Stability and periodicity of difference equations with finite delay*, *Funkcialaj Ekvacioj* 37 (1994), 401–413 (with Zhang).
52. *Periodicity and stability of linear Volterra Difference Systems*, *J. Math. Anal. and Appl.* 181 (1994), 483–492.
53. *Global stability of difference equations*, *Proceedings of the First World Congress of Nonlinear Analysis '92*, Walter de Gruyter Publisher (1996), 1131–1138 (Ed. V. Lakshmikantham).
54. *Stability of Volterra difference equations of convolution type*, *Dynamical Systems* (ed. Liao Shan-Tao et al.), pp. 66–73, World Scientific, 1993.
55. *Weakly Anosov diffeomorphisms and exponential trichotomy*, *Libertas Mathematica* 12 (1992), 99–107 (with Farran).
56. *Stability of integrodifferential systems of nonconvolution type*, *Proceedings International Symposium on Functional Differential Equations*, Kyoto, World Scientific (1991), 67–74.
57. *On variation of equicontinuity in dynamical systems*, *Bulletin Australian Math. Soc.* 42 (1991), 391–397 (with Farran).
58. *Asymptotic stability of linear systems with infinite delay*, (Ed. Yoshizawa and Kato), World Scientific (1991), 67–74.
59. *The existence of periodic solutions of Volterra equations with infinite delay*, *Differential Equations, Stability and Control*, (ed.-Elaydi), Marcel Dekker, Inc., (1990), 105–113 (with Cushman).
60. *Recent results on stability of differential, integrodifferential equations and dynamical systems*, *Proceedings International Conference on Nonlinear Analysis and Applications to Biomathematics*, (ed. Murty), 60–79, Eskay Enterprises (Printing Division), Pradesh, India, (1990).
61. *Strongly stable semidynamical systems with global backward extensions*, *Applicable Analysis* 39 (1990), 1–13 (with Farran).
62. *Exponential dichotomy and trichotomy of nonlinear differential equations*, *Diff. and Integral Eq.* 3 (1990), 1201–1334 (with Hacek).
63. *Stability of difference equations via Liapunov functions*, *Proceedings of the International Conference on Differential Equations*, (ed.-Aftabizadeh), 235–238, Ohio University Press, (1989) (with Peterson).
64. *A unified approach to stability problems in integrodifferential equations*, *J. Math. Anal. and Appl.* 143 (1989), 503–531 (with Sivasundaram).
65. *Asymptotic stability in general dynamical systems*, *Nonlinear Analysis, Theory, Methods & Appl.* 13 (1989), 657–669 (with Kaul).

66. Lipschitz stability of nonlinear systems of differential equations II: Liapunov functions, *J. Math. Anal. Appl.* 143 (1989), 517-529 (with Dannan).
67. Nearly periodic dynamical systems, *Appl. Analysis* 27 (1988), 243-251 (with Ahmad).
68. Semiflows with global extensions II: notions of negative stability, *Nonlinear Analysis, Theory, Methods & Appl.* 12 (1988), 733-746 (with Kaul).
69. Lipschitz stability of nonlinear integrodifferential equations, *J. Applied Math. And Comp.* 27 (1988), (with Rao).
70. Exponential trichotomy of differential systems, *J. Math. Analysis and Appl.* 129 (1988), 362-374 (with Hajek).
71. Some remarks on nonlinear dichotomy and trichotomy, *Nonlinear Analysis and Appl.* (ed. Lakshmikantham), 175-178, Marcel Dekker, Inc., (1987) (with Hajek).
72. Exponentially asymptotically stable systems, *Appl. Analysis* 25 (1987), 243-252 (with Farran).
73. Stability of limit and prolongation sets in semiflows, *Appl. Analysis* 23 (1987), 261-276 (with Kaul).
74. Semiflows with global extensions, *Nonlinear Analysis, Theory, Methods & Appl.* 10 (1986), 713-726 (with Kaul).
75. Lipschitz stability of nonlinear systems of differential equations, *J. Math. Analysis & Appl.* 113 (1986), 562-577 (with Dannan).
76. A flow associated with a semiflow, *Trends in Theory and Practice on Non-linear Analysis*, Arlington, Texas, North Holland, (1985), 155-159 (with Kaul).
77. Exponential dichotomy of nonlinear systems of differential equations, *Trends in Theory and Practice on Nonlinear Analysis*, Arlington, Texas, North Holland, (1985), 145-153 (with Hajek).
78. Some notions of stability in differential equations and dynamical systems, *Proceedings of Midwest Conference on Differential Equations*, Iowa City, IA, October 1983. Institute of Applied Math., University of Missouri-Rolla, (1985), 41-53 (ed.-Henderson).
79. Lipschitz stable dynamical systems, *Nonlinear Analysis, Theory, Methods & Appl.* 9 (1985), 729-738 (with Farran).
80. On weak isometrics and their embeddings in flows, *Nonlinear Analysis, Theory, Methods & Appl.* 8 (1984), 1437-1441 (with Farran).
81. Isometrics and certain dynamical systems, *Bull. Austral. Math. Soc.* 30 (1984), 239-248 (with Farran).
82. Semidynamical systems with nonunique global backward extensions II: the negative aspects, *Funkcialaj. Ekvacioj* 27 (1984), 85-100.
83. Attraction in topological dynamics, *J. Differential Eq.* 51 (1984), 116-125.
84. Transformation groups of strong characteristic O , *Bulletin Austral. Math. Soc.* 27 (1983), 243-248.
85. Semidynamical systems with nonunique global backward extensions, *Funkcialaj. Ekvacioj* 26 (1983), 173-187.
86. On some stability notions in topological dynamics, *J. Differential Eq.* 47 (1983), 23-34.
87. On characteristic O and locally weakly almost periodic flows, *Math. Japonica* 27 (1982) 613-624.
88. Flows of almost strong characteristic O with generative phase groups, *Nonlinear Analysis, Theory, Methods & Appl.* 6 (1982) (with Kaul).
89. P -equicontinuous flows, *Funkcialaj Ekvacioj* (1982), 43-49.
90. P -recursion and transformation groups of characteristic O , *J. Univ. Kuwait* 9 (1982), 807-815.
91. Criteria for regionally recurrent flows, *Proc. Amer. Math. Soc.* 85 (1982), 461-468.
92. On locally weakly almost periodic transformation groups, *Bull. Austral. Math. Soc.* 25 (1982), 215-219.

93. *Strongly stable dynamical systems, Proceedings of the International Conference on Functional Differential Systems and Related Topics, Blazejewko, Poland, (ed.-M... Kiselewicz), Zielona Gora, (1981), 105-110.*
94. *Weakly equicontinuous flows, Funkcialaj. Ekvacioj 24 (1981), 317-324.*
95. *On equicontinuous transformation groups, Bull. Austral. Math. Soc. 24 (1981), 367-372.*
96. *Active preferred sets in almost regular flows, Math. Japonica 26 (1981), 367-372.*
97. *A note on the number of normal subgroups of a group, J. Univ Kuwait 8 (1981), 95-106.*
98. *A theorem on almost periodicity, J. Univ. Kuwait (Science) 6 (1979), 31-33.*
99. *Preferred Sets in topological dynamics, Proceedings of the American Math Soc, Vol. 63, No. 2 (Apr., 1977), pp. 334-338*

Papers in progress:

- *On the connectedness of global attractors, Preprint (with Miller)*
- *Population Models with Allee effect: A new Model (with Sacker)*