CURRICULUM VITÆ

Peter Gavin Lawrence LEACH

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1 Biographical Data

Date of birth: 28 November 1941; place of birth: Hawthorn, Victoria, Australia; Citizenship: South African and Australian

Residential address: 21 Edgecourt Road, Rose Glen, Durban 4001, Republic of South Africa. Tel: + 27-31-207-1476

Occupational address: School of Mathematical Sciences, University of KwaZulu-Natal, Durban 4041, Republic of South Africa
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Present position: Professor of Mathematics, University of KwaZulu-Natal, Durban

Academic qualifications: BSc (Melbourne University 1963); DipEd (Melbourne University 1967); BA (Melbourne University 1969); MSc (La Trobe University 1977); PhD (La Trobe University 1979); DSc (University of Natal 1996)

Honours: Fellow of the University of Natal (1996); Elected Member of the Academy of Nonlinear Sciences (Russian Republic) (1997); Elected Fellow of the Royal Society of South Africa (1998); Gold Medallist of the South African Mathematical Society (2001); Distinguished Research Award of the South African Mathematical Society (2002)

Academic appointments: (1970–1975) Lecturer in Mathematics, Institute of Technology, Bendigo, Victoria; (1976–1977) Tutor, (1978–1979) Senior Tutor, (1980–1981) Principal Tutor, (1982–1983) Lecturer, Department of Applied Mathematics, La Trobe University; (1983–1990) Professor of Applied Mathematics, University of the Witwatersrand, Johannesburg; (1990– 2003) Professor of Mathematics, School of Mathematical and Statistical Sciences, University of Natal (Durban); (2004 –) Professor of Mathematics, School of Mathematical Sciences, University of KwaZulu-Natal (Howard College); (1994–1995) Visiting Professor, Department of Mathematics, University of the Aegean, Greece; (1995–1996) Visiting Professor, Département mathématiques, Université d'Orléans, France

Research interests: Algebraic and analytical properties of ordinary and partial differential equations which arise in mathematical and scientific studies and their solution. Particular areas of applications lie in classical and quantum mechanics, plasma and nuclear physics, cosmology, field theory and modelling of biological and financial systems. Molecular structure and spectroscopy.

2 Professional Service

Supervisor: In the period 1980 to the present thirteen masters and nine doctoral were successfully supervised. Presently there are four masters and two doctoral students.

Examiner: In the period 1979-2005 ten magisterial dissertations and ten doctoral theses (including one each in France, Greece and Sweden)

Reviewer for Mathematical Reviews from 1979 and Zentralblatt from 2002 and referee at various times since 1978 for over 30 journals

Associate Editor of the Journal of Mathematical Analysis and Applications since 1998, Member of the Editorial Board of the Journal of Nonlinear Mathematical Physics since 1997 and Member of the Editorial Board of EqWorld: The World of Mathematical Equations

Research Establishments: foundation member of the Centre for Nonlinear Studies, University of the Witwatersrand, Johannesburg, (1986); the Centre for Theoretical and Computational Chemistry, University of Natal, Durban, (1993); the Research Laboratory for Geometry, Dynamical Systems and Cosmology, University of the Aegean, Greece, (1998)

Institutions visited: Los Alamos National laboratory, Los Alamos, New Mexico (1980, 1981, 1982, 1988); Rijksuniversitiet se Gent, Gent, Belgium (1982, 1984, 1986, 1987, 1989, 1990); PMMS/CNRS – Université d'Orléans, Orléans, France (1986, 1987, 1989, 1991, 1994, 1995, 1995-1996, 1996-1997, 1997); Washington University, St Louis (1988, 1994); IHES, Bures-sur-Yvette, France (1988); University of Uppsala, Sweden (1989); University of the Aegean, Samos, Greece (1990, 1992, 1993, 1994-1995, 1996, 1997 (bis),1997-1998, 1998, 1998-1999, 1999, 1999-2000, 2000-2001, 2001, 2001-2002, 2002, 2002-2003, 2003, 2003-2004, 2004, 2004-2005, 2005, 2005-2006); Salk Institute, La Jolla (1990, 1994); Institute of Nuclear Physics, Czech Academy of Sciences (1991, 1995); Commissariat Energie Atomique, France (1993, 1998, 2000); University of Georgia, Athens, Georgia (1994); University of Illinois, Urbana, Illinois (1994); Dartmouth College, New Hampshire (1994); University of Catania (1994); Inter University Centre for Astronomy and Astrophysics, Pune, India (1995); University of Cyprus, Cyprus (1999); Universitá di Perugia, Italy (2000, 2001, 2002 (bis), 2003 (bis), 2004, 2005, 2006); University of the Aegean, Lesvos, Greece (2000, 2001, 2002, 2003, 2005); LuleåUniversity of Technology, Luleå, Sweden (2001 (bis)); University of Athens, Athens, Greece (2001); University of Palermo, Palermo, Italy (2003); Middle East Technical University, Ankara, Turkey (2004); Aristotelian University of Thessaloniki, Thessalonika, Greece (2005 (bis)), Institut Mittag-Leffler, Djursholm, Sweden (2005)

3 Publications

3.1 Articles in specialist journals and refereed proceedings

1. Günther NJ & Leach PGL (1977) Generalized invariants for the time-dependent harmonic oscillator *Journal of Mathematical Physics* **18** 572-576

2. Leach PGL (1977) On a direct method for the determination of an exact invariant for the time-dependent harmonic oscillator *Journal of the Australian Mathematical Society, Series B* **20** 97-105

3. Eliezer CJ & Leach PGL (1977) The Equivalence Principle and Quantum Mechanics *American Journal of Physics* **45** 1218-1221

4. Leach PGL (1977) On the theory of time-dependent linear canonical transformations as applied to Hamiltonians of the harmonic oscillator type *Journal of Mathematical Physics* **18** 1608-1611

5. Leach PGL (1977) Invariants and wave-functions for some time-dependent harmonic oscillator-type Hamiltonians *Journal of Mathematical Physics* **18** 1902-1907

6. Leach PGL (1978) Quadratic Hamiltonians, quadratic invariants and the symmetry group SU(n) *Journal of Mathematical Physics* **19** 446-451

7. Leach PGL (1978) On a generalization of the Lewis Invariant for the time-dependent harmonic oscillator *SIAM Journal of Applied Mathematics* **34** 496-503

8. Leach PGL (1978) A note on the time-dependent damped and forced oscillator *American Journal of Physics* **46** 1247-1249

9. Leach PGL (1979) On nonlinear transformations for time-dependent polynomial Hamiltonians *Journal of Mathematical Physics* **20** 86-95

10. Leach PGL (1979) Towards an invariant for the time-dependent anharmonic oscillator *Journal of Mathematical physics* **20** (1979) 96-100

11. Prince GE, Leach PGL, Kalotas TM, Eliezer CJ & Santilli RM (1979) The Lie and Lie-admissable symmetries of dynamical systems *Hadronic Journal* **3** 390-439

12. Leach PGL (1980) A note on the Hénon-Heiles problem *Journal of Mathematical Physics* **21** 38-43

13. Leach PGL (1980) Quadratic Hamiltonians: The four classes of invariants, their interrelations and symmetries *Journal of Mathematical Physics* **21** 32-37

14. Leach PGL (1980) The complete dynamical symmetry of the one-dimensional time-dependent harmonic oscillator *Journal of Mathematical Physics* **21** 300-304

15. Leach PGL (1980) $Sl(3, R)$ and the repulsive oscillator *Journal of Physics A: Mathematical and General* **13** 1991-2000

16. Leach PGL (1980) The complete symmetry group of a forced harmonic oscillator *Journal of the Australian Mathematical Society* **22** (Series B) 12-21

17. Prince GE & Leach PGL (1980) The Lie theory of extended groups in Hamiltonian mechanics *Hadronic Journal* **3** 941-961

18. Leach PGL (1981) Applications of the Lie theory of extended groups in Hamiltonian mechanics: the oscillator and the Kepler problem *Journal of the Australian Mathematical Society* **23** (Series B) 173-186

19. Leach PGL (1981) An exact invariant for a class of time-dependent anharmonic oscillators with cubic anharmonicity *Journal of Mathematical Physics* **22** 465-470

20. Leach PGL (1981) A further note on the Hénon-Heiles problem *Journal of Mathematical Physics* **22** 679-682

21. Leach PGL (1981) Comment on a letter of P Chattopadhyay *Physics Letters* **84A** 161-162

22. Lewis HR & Leach PGL (1982) Exact invariants for a class of time-dependent nonlinear Hamiltonian systems *Journal of Mathematical Physics* **23** 165-175

23. Lewis HR & Leach PGL (1982) A direct approach for determining exact invariants for one dimensional time-dependent classical systems *Journal of Mathematical Physics* **25** 2371-2374

24. Leach PGL (1983) Harmonic oscillator with variable mass *Journal of Physics A: Mathematical and General* **16** 3261-3269

25. Leach PGL (1983) Laplace transforms of Airy functions via their integral definitions *Journal of Physics A: Mathematical and General* **16** L451-L453

26. Leach PGL (1983) A theorem for time-dependent dynamical systems *Physics Letters* **98A** 89-91

27. Leach PGL (1983) First integrals for nonautonomous Hamiltonian systems *Atti della Accademia delle Scienze di Torino, Supplemento al vol* **117** 575-579

28. Leach PGL, Lewis HR & Sarlet W (1984) First integrals for a class of nonlinear Hamiltonian systems *Journal of Mathematical Physics* **25** 486-490

29. Leach PGL (1984) Exact solutions of the Schrödinger equation for a class of three-dimensional isotropic anharmonic oscillators *Journal of Mathematical Physics* **25** 2974-2978

30. Leach PGL (1984) First integrals via polynomial canonical transformations *Journal of Mathematical Physics* **25** 3221-3226

31. Leach PGL (1985) Classes of potentials of time-dependent central force fields which possess first integrals quadratic in the momenta *Journal of Mathematical Physics* **26** 1613-1620

32. Leach PGL (1985) First integrals for the modified Emden equation $\ddot{q} + \alpha(t)\dot{q} + q^n = 0$ *Journal of Mathematical Physics* **26** 2510-2514

33. Lewis HR & Leach PGL (1985) A resonance formulation for invariants of particle motion in a one-dimensional time-dependent potential *Annals of Physics* **164** 47-76

34. Sarlet W, Leach PGL & Cantrijn F (1985) Exact versus configurational invariants and a weak form of complete integrability *Physica* **17D** 87-98

35. Leach PGL (1985) Exact solutions of the Schrödinger equation for a class of anharmonic oscillators *Physica* **17D** 331-338

36. Mahomed FM & Leach PGL (1985) The linear symmetries of a nonlinear differential equation *Quæstiones Mathematicæ* **8** 241-274

37. Leach PGL (1986) Comment on an aspect of a paper by G Thompson *Journal of Mathematical Physics* **27** 153-156

38. Steeb W-H, Louw JA, Leach PGL & Mahomed FM (1986) Hamiltonian systems with three degrees of freedom, singular-point analysis and chaotic behaviour *Physical Review A* **33** 2131-2133

39. Leach PGL (1986) Erratum: Comment on an aspect of a paper by G Thompson *Journal of Mathematical Physics* **27** 2445-2446

40. Sarlet W, Mahomed FM & Leach PGL (1987) Symmetries of nonlinear differential equations and linearization *Journal of Physics A: Mathematical and General* **20** 277-292

41. Leach PGL (1987) The first integrals and orbit equation for the Kepler Problem with drag *Journal of Physics A: Mathematical and General* **20** 1997-2002

42. Gorringe VM & Leach PGL (1987) Conserved vectors for the autonomous system $\ddot{\mathbf{r}}+g(r,\theta)\hat{\mathbf{r}}+h(r,\theta)\hat{\theta} = 0$ *Physica* **27D** 243-248

43. Leach PGL &Gorringe VM (1987) Variations on Newton's Keplerian theme *South African Journal of Science* **83** 550-555

44. Blecher MH & Leach PGL (1987) The Schrödinger equation for the $x^2 + \lambda x^2/(1 + gx^2)$ interaction *Journal of Physics A: Mathematical and General* **20** 5923-5927

45. Gorringe VM & Leach PGL (1988) Lie point symmetries for systems of second order linear ordinary differential equations *Quæstiones Mathematicæ* **11** 95-117

46. Gorringe VM & Leach PGL (1988) Energy levels for quantum anharmonic oscillators *South African Journal of Physics* **11** 1-7

47. Euler N, Leach PGL, Mahomed FM Steeb W-H (1988) Symmetry vector fields and similarity solutions of a nonlinear field equation discribing the relaxation to a Maxwell distribution *International Journal of Theoretical Physics* **27** 717-723

48. Gorringe VM & Leach PGL (1988) Conserved vectors and orbit equations for motions in two and three dimensions *Proceedings of the Workshop on Finite Dimensional Integrable Nonlinear Dynamical Systems*, Leach PGL & Steeb W-H edd (World Scientific Press, Singapore) 190-204

49. Mahomed FM & Leach PGL (1988) Normal forms for third order equations *Proceedings of the Workshop on Finite Dimensional Integrable Nonlinear Dynamical Systems*, Leach PGL & Steeb W-H edd (World Scientific Press, Singapore) 178-189

50. Gorringe VM & Leach PGL (1988) Hamiltonlike vectors for a class of Kepler problems with drag *Celestial Mechanics* **41** 125-130

51. Leach PGL & Mahomed FM (1988) Maximal subalgebra associated with a first integral of a system possessing $sl(3, R)$ symmetry *Journal of Mathematical Physics* **29** 1807-1813

52. Leach PGL & Gorringe VM (1988) A conserved Laplace-Runge-Lenz-like vector for a class of three dimensional motions *Physics Letters A* **133** 289-294

53. Leach PGL, Feix MR & Bouquet S (1988) Analysis and solution of a nonlinear second order differential equation through rescaling and through a dynamical point of view *Journal of Mathematical Physics* **29** 2563-2569

54. Leach PGL, Flessas GP & Gorringe VM (1989) A Rodrigues formula approach to determining closed form solutions to the Schrödinger equation for symmetric anharmonic oscillators *Journal of Mathematical Physics* **30** 406-412

55. Gorringe VM & Leach PGL (1989) Conserved vectors and orbit equations for autonomous systems governed by the equation of motion $\ddot{\mathbf{r}} + f\dot{\mathbf{r}} + g\mathbf{r} = \mathbf{0}$ *American Journal of Physics* **57** 432-435

56. Mahomed FM & Leach PGL (1989) The Lie algebra $sl(3, R)$ and linearization *Quæstiones Mathematicæ* **12** 121-139

57. Ramatlhape J, Eyre D & Leach PGL (1989) Amplitude-phase method for finding eigenvalues of a two-dimensional Schrödinger equation *South African Journal of Physics* **12** 61-65

58. Taylor DR & Leach PGL (1989) Exact solutions of the Schrödinger equation for nonseparable anharmonic potentials in two dimensions *Journal of Mathematical Physics* **30** 1525-1532

59. Mahomed FM & Leach PGL (1989) Lie algebras associated with scalar second-order ordinary differential equations *Journal of Mathematical Physics* **30** (1989) 2770-2777

60. Taylor DR & Leach PGL (1990) Single resonance integrals for two-dimensional Hamiltonians *Annals of Physics* **198** 358-370

61. Mahomed FM & Leach PGL (1990) Symmetry Lie algebras of nth order ordinary differential equations *Journal of Mathematical Analysis and Applications* **151** 80-107

62. Leach PGL & Gorringe VM (1990) The relationship between the symmetries of and the existence of conserved vectors for the equation $\ddot{\mathbf{r}} + f(r)\mathbf{L} + \mathbf{g}(r)\hat{\mathbf{r}} = \mathbf{O}$ *Journal of Physics A: Mathematical and General* **23** 2765-2774

63. Leach PGL (1990) Berry's phase and wave functions for time-dependent Hamiltonian systems *Journal of Physics A: Mathematical and General* **23** 2695-2699

64. Hislop D, Wolfaardt MF & Leach PGL (1990) The Schrödinger equation for the $f(x)/g(x)$ interaction *Journal of Physics A: Mathematical and General* **23** L1109-L1112

65. Bouquet SÉ, Feix MR & Leach PGL (1991) Properties of second order ordinary differential equations invariant under time-translation and self-similar transformation *Journal of Mathematical Physics* **32** 1480-1490

66. Flessas GP & Leach PGL (1991) A completely integrable case in the complex Lorenz equations *Physics Letters A* **154** 127-130

67. Leach PGL (1991) Generalized Ermakov Systems *Physics Letters* **158A** 102-106

68. Maharaj SD, Leach PGL & Maartens R (1991) Shear-free spherically symmetric solutions with conformal symmetry *General Relativity and Gravitation* **23** 261-267

69. Gorringe VM & Leach PGL (1991) First integrals associated with the additional symmetry of central force problems with power law potentials *Quæstiones Mathematicæ* **14** 277-289

70. Mahomed FM & Leach PGL (1991) Contact symmetries of second order differential equations *Journal of Mathematical Physics* **32** 2051-2055

71. Leach PGL & Maharaj SD (1992) A first integral for a class of time-dependent anharmonic oscillators with multiple anharmonicities *Journal of Mathematical Physics* **33** 2023-2030

72. Lewis H Ralph, Leach PGL, Bouquet Serge & Feix Mark R (1992) Representations of one-dimensional Hamiltonians in terms of their invariants *Journal of Mathematical Physics* **33** 591-598

73. Leach PGL (1992) Comment on an aspect of a letter of Shivamoggi and Muilenburg *Physics Letters* **168A** 460-462

74. Leach PGL, Maartens R & Maharaj SD (1992) Self-similar solutions of the generalized Emden-Fowler equation *International Journal of Nonlinear Mechanics* **27** 575-582

75. Znojil M & Leach PGL (1992) On the elementary Schrödinger bound states and their multiplets *Journal of Mathematical Physics* **33** 2785-2794

76. Hislop DJ & Leach PGL (1992) Quasi exact solutions for a class of anharmonic quantum oscillators *South African Journal of Physics* xxx-xxx

77. Abraham-Shrauner B & Leach PGL (1993) Hidden symmetries of nonlinear ordinary differential equations *Exploiting symmetry in Applied and Numerical Analysis* E Allgower, K Georg and R Miranda edd (Lectures in Applied Mathematics **29** , AMS, Providence) 1-10

78. Gorringe VM & Leach PGL (1993) The first integrals and their Lie algebra of the most general autonomous Hamiltonian of the form $H = T + V$ possessing a Laplace-Runge-Lenz vector *Journal of the Australian Mathematical Society Series B* **34** 511-522

79. Leach PGL, Govinder KS, Brazier TI & Schei CS (1993) The ubiquitous time-dependent simple harmonic oscillator *South African Journal of Science* **89** 126-130

80. White D, Taverner BC, Leach PGL & Coville NJ (1993) Quantification of substituent size by the use of solid angles *Journal of Computational Chemistry* **14** 1042-1049

81. Govinder KS, Athorne C & Leach PGL (1993) The algebraic structure of generalized Ermakov systems in three dimensions *Journal of Physics A: Mathematical and General* **26** 4035-4046

82. Lemmer RL & Leach PGL (1993) The Painlevé test, hidden symmetries and the equation $y'' + yy' + ky^3 = 0$ *Journal of Physics A: Mathematical and General* **26** 5017-5024

83. Mahomed FM, Kara AH & Leach PGL (1993) Lie and Noether counting theorems for one-dimensional systems *Journal of Mathematical Analysis and Applications* **178** 116-129

84. Gorringe VM & Leach PGL (1993) Kepler's third law and the oscillator's isochronism *American Journal of Physics* **61** 991-995

85. Leach PGL, Bouquet S & Dewisme A (1993) Symmetries of Hamiltonian one-dimensional systems *International Journal of Nonlinear Mechanics* **28** 705-712

86. Govinder KS & Leach PGL (1993) Generalized Ermakov Systems in terms of $sl(2, R)$ invariants *Quæstiones Mathematicæ* **16** 405-412

87. Lemmer RL & Leach PGL (1994) The Lie analysis and solutions for a class of second order nonlinear differential equations *International Journal of Nonlinear Mechanics* **29** 177-185

88. Flessas GP, Leach PGL & Cotsakis S (1994) Noetherian first integrals *Canadian Journal of Physics* **74** 86-88

89. Cotsakis Spiros & Leach PGL (1994) Painlevé analysis of the Mixmaster universe *Journal of Physics A: Mathematical and General* **27** 1625-1631

90. Govinder KS & Leach PGL (1994) Ermakov systems: a group theoretic approach *Physics Letters A* **186** 391-395

91. Govinder KS & Leach PGL (1994) Integrability of generalized Ermakov systems *Journal of Physics A: Mathematical and General* **27** 4153-4157

92. Govinder KS & Leach PGL (1994) Algebraic properties of angular momentum type first integrals *Lie Groups & their Applications* **1** 95-102

93. Heil T & Leach PGL (1994) The Quantum Mechanical Two-state Problem: Group Analysis and New Analytical Solutions *Lie Groups & their Applications* **1** 103-112

94. Leach PGL & Govinder KS (1994) Symmetries in Classical Mechanics *Lie Groups & their Applications* **1** 146-158

95. Cotsakis Spiros, Leach Peter & Flessas George (1994) Minimally coupled scalar field wormholes *Physical Review D* **49** 6489-6492

96. White David, Taverner B Craig, Leach PGL & Coville Neil J (1994) Solid angles I *Journal of Organometallic Chemistry* **478** 205-211

97. Mellin Conrad M, Mahomed FM & Leach PGL (1994) Solution of generalized Emden-Fowler equations with two symmetries *International Journal of Nonlinear Mechanics* **29** 529-538

98. Flessas GP, Govinder KS & Leach PGL (1994) Remarks on the symmetry Lie algebras of first integrals of scalar third order ordinary differential equations with maximal symmetry *Bulletin of the Greek Mathematical Society* **36** 63-79

99. Brazier TI & Leach PGL (1994) Invariants for dissipative systems and Noether's theorem *Revista Mexicana Físıca* **40** 378-385

100. Kara AH, Mahomed FM & Leach PGL (1994) Noether equivalence problem for particle Lagrangians *Journal of Mathematical Analysis and Applications* **188** 867-884

101. Govinder KS & Leach PGL (1995) Solution of the non-linear differential equation $y" + p(x)y = q_m(x)/y^{2m-1}$ *Transactions of the Royal Society of South Africa* **49** 175-184

102. Govinder KS, Leach PGL & Maharaj SD (1995) Integrability analysis of a conformal equation arising in relativity *International Journal of Theoretical Physics* **34** 625-639

103. Govinder KS & Leach PGL (1995) The algebraic structure of the first integrals of third order linear equations *Journal of Mathematical Analysis and Applications* **193** 114-133

104. Maharaj SD, Leach PGL & Govinder KS (1995) Cosmic strings in Bianchi III spacetime: integrable cases *Pramana Journal of Physics* **44** 511-518

105. Govinder KS & Leach PGL (1995) Paradigms of Ordinary Differential Equations *South African Journal of Science* **91** 306-311

106. Govinder KS & Leach PGL (1995) On the determination of nonlocal symmetries *Journal of Physics A: Mathematical and General* **28** 5349-5359

107. Abraham-Shrauner B, Leach PGL, Govinder KS & Ratcliff Gail (1995) Hidden and contact symmetries of ordinary differential equations *Journal of Physics A: Mathematical and General* **28** 6707-6716

108. Govinder KS & Leach PGL (1995) Noetherian integrals via nonlocal transformation *Physics Letters A* **201** 91-94

109. Abraham-Shrauner B, Govinder KS & Leach PGL (1995) Integration of second order equations not possessing point symmetries *Physics Letters A* **203** 169-174

110. Flessas GP, Leach PGL & Cotsakis S (1995) On Noether's formulation of her theorem *Canadian Journal of Physics* **73** (1995) 543

111. White David P, Leach PGL & Coville Neil J (1995) Solid angles 5. Chiral molecules and the case of face selectivity *Journal of Mathematical Chemistry* **18** 99-114

112. Govinder KS & Leach PGL (1996) The nature and uses of symmetries of ordinary differential equations *South African Journal of Science* **92** 23-28

113. Maharaj SD & Leach PGL (1996) Exact solutions for the Tikekar superdense star *Journal of Mathematical Physics* **37** 430-437

114. Leach PGL & Govinder KS (1996) The use of Lie symmetries and the Painlevé analysis in Cosmology *Quæstiones Mathematicæ* **19** 163-182

115. Patel LK, Maharaj SD & Leach PGL (1996) Cosmic strings in Bianchi II, VIII and IX spacetimes: integrable cases *Pramana – journal of physics* **46** 331-339

116. Hua DD, Cairó L, Feix MR, Govinder KS & Leach PGL (1996) Connection between the existence of first integrals and the Painlevé Property in Lotka-Volterra and Quadratic Systems *Proceedings of the Royal Society of London* **452** 859-880

117. Maharaj SD, Leach PGL & Maartens R (1996) Expanding spherically symmetric solutions without shear *General Relativity and Gravitation* **28** 35-50

118. Pillay T & Leach PGL (1996) Comment on a theorem of Hojman and its generalisations *Journal of Physics A: Mathematical and General* **29** 6999-7002

119. Govinder KS & Leach PGL (1997) A group theoretic approach to a class of second order ordinary differential equations not possessing Lie point symmetries *Journal of Physics A: Mathematical and General* **30** 2055-2068

120. Gorringe VM & Leach PGL (1997) Conservation laws for the monopole oscillator problem *Quæstiones Mathematicæ* **20** 71-83

121. Flessas GP, Govinder KS & Leach PGL (1997) Characterisation of the algebraic properties of first integrals of scalar ordinary differential equations of maximal symmetry *Journal of Mathematical Analysis and Applications* **212** 349-374

122. Feix MR, Géronimi C, Cairó L, Leach PGL, Lemmer RL & Bouquet SÉ (1997) On the singularity analysis of ordinary differential equations invariant under time translation and rescaling *Journal of Physics A: Mathematical and General* **30** 7437-7461

123. Pillay T & Leach PGL (1997) A general approach to the symmetries of differential equations *Problems of Nonlinear Analysis in Engineering Systems* **2** 33-39

124. Cotsakis S,Lemmer RL & Leach PGL (1998) Mathematical aspects of the Mixmaster dynamical system *Physical Review D* **57** 4691-4698

125. Moyo S, Verstraete JBA & Leach PGL (1998) Non-Noetherian Lie symmetries are Noetherian Symmetries *Advances in Systems, Signals, Control and Computers* Bajić VB ed (IAAMSAD & ANS (South Africa), Durban) Vol II, 72-76

126. Pillay T & Leach PGL (1998) The fate of Kepler's laws of planetary motion in the Kepler-Dirac problem *South African Journal of Science* **94** 482-486

127. Leach PGL, Maharaj SD & Govinder KS (1998) Closed form solutions for equations derived from the Einstein field equations *Il Nuovo Cimento* **113B** 489-497

128. Moyo S & Leach PGL (1998) Noether's theorem in classical mechanics *Scientific Bulletin of the Polytechnical University of Bucharest Series A: Applied Mathematics and Physics* **60** 221-234

129. Cotsakis S, Pantazi H & Leach PGL (1998) Symmetries of Homogeneous Cosmologies *Gravitation and Cosmology* **4** 314-325

130. Govinder KS & Leach PGL (1998) An elementary demonstration of the existence of $sl(3, R)$ symmetry for all second order linear ordinary differential equations *SIAM Review* **40** 945-946

131. Leach PGL (1999) Hierarchies of similarity symmetries and singularity analysis *Dynamical Systems, Plasmas and Gravitation* Leach PGL, Bouquet SÉ, Rouet J-L & Fijkalow E edd (Springer-Verlag, Heidelberg) 304-312

132. Géronomi Claude, Feix Marc R & Leach Peter GL (1999) Periodic solutions, limit cycles and the generalised Chazy equation *Dynamical Systems, Plasmas and Gravitation* Leach PGL, Bouquet SÉ, Rouet J-L & Fijkalow E edd (Springer-Verlag, Heidelberg) 327-335

133. Leach PGL, Govinder KS & Abraham-Shrauner B (1999) Symmetries of first integrals and their associated differential equations *can Journal of Mathematical Analysis and Applications* **235** 58-83

134. Leach PGL & Govinder KS (1999) On the uniqueness of the Schwarzian and linearisation by nonlocal contact transformation *Journal of Mathematical Analysis and Applications* **235** 84-107

135. Pillay T & Leach PGL (1999) Generalized Laplace-Runge-Lenz vectors and nonlocal symmetries *South African Journal of Science* **95** 403-407

136. Govinder KS, Leach PGL & Maharaj SD (1999) Exact solutions for shear free motion of spherically symmetric charged perfect fluid distribution *North Bengal University Review* **10** 23-32

137. Lemmer RL & Leach PGL (1999/1420) A classical viewpoint on quantum chaos *Arab Journal of Mathematical Sciences* **5** 1-17

138. Pillay T & Leach PGL (2000) Chaos, integrability and symmetry *South African Journal of Science* **96** 371-376

139. Leach PGL, Cotsakis S & Flessas GP (2000) Symmetry, singularity and integrability in complex dynamics: I The reduction problem *Journal of Nonlinear Mathematical Physics* **7** 445-479

140. Leach PGL, Cotsakis S & Flessas GP (2000) Symmetry, singularity and integrability in complex dynamics II: Rescaling and time-translation in two-dimensional systems *Journal of Mathematical Analysis and Applications* **251** 587-608

141. Nucci MC & Leach PGL (2000) The determination of nonlocal symmetries by the method of reduction of order *Journal of Mathematical Analysis and Applications* **251** 871-884

142. Cotsakis S, Flessas GP, Leach PGL & Querella L (2000) Ever-expanding, isotropizing, quadratic cosmologies *Gravitation & Cosmology* **6** 291-302

143. Miritzis J, Leach PGL & Cotsakis S (2000) Symmetry, singularities and integrability in complex dynamics IV: Painlevé integrability of isotropic cosmologies *Gravitation & Cosmology* **6** 282-290

144. Leach PGL & Moyo S (2000) Exceptional properties of second and third order ordinary differential equations of maximal symmetry *Journal of Mathematical Analysis and Applications* **252** 840-863

145. Leach PGL, Moyo S, Cotsakis S & Lemmer RL (2001) Symmetry, singularities and integrability in complex dynamics III: Approximate symmetries and invariants *Journal of Nonlinear Mathematical Physics* **8** 139-156

146. Nucci MC & Leach PGL (2001) The harmony in the Kepler and related problems *Journal of Mathematical Physics* **42** 746-764

147. Andriopoulos K, Leach PGL & Flessas GP (2001) Complete symmetry groups of ordinary differential equations and their integrals: some basic considerations *Journal of Mathematical Analysis and Applications* **262** 256-273

148. Leach PGL & Flessas GP (2001) Solutions in closed form and as power series to the real Lorenz equations *Journal of Physics A: Mathematical and General* **34** 6013-6029

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3.2 Unrefereed conference proceedings and other articles

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2. Leach PGL (1980) The Lie theory of extended groups - is it of relevance to quantum mechanics? *Lecture Notes in Physics* **135** Wolf KB ed (Springer Verlag, Berlin) 129-133

3. Lewis H Ralph& Leach PGL (1982) Exact invariants for time-dependent nonlinear Hamiltonian systems *Nonlinear Problems Present and Future* Bishop AR, Campbell DK & Nicolenko B edd (North Holland, New York) 133-145

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3.3 Conference and Seminar Series organised

1. Differential Equations Seminar (Joint series with the University of Pretoria) (with Penning F, UP) 1986-1990

2. Workshop on Finite Dimensional Integrable Nonlinear Dynamical Systems (January 11-15, 1988, University of the Witwatersrand, Johannesburg) (with Steeb W-H)

3. Dynamical Systems and Chaos Workshop (June 29-July 1, 1992, Willem Pretorius Game Reserve, Orange Free State) (with Herbst B)

4. Modern Group Analysis Workshop (October 27-31, 1992, Acireale, Sicily) (member of the Scientific Committee)

5. Dynamical Systems and Chaos Workshop (July 8-10, 1993, University of Natal, Durban)

6. Nineteenth South African Symposium on Numerical Mathematics (July 12-14, 1993, San Lameer) (with Eyre D & Carté E)

7. International Conference on Modern Group Analysis (January 16-22, 1994, Johannesburg, South Africa) (member of the Scientific and Organising Committees)

8. Twentieth South African Symposium on Numerical Mathematics (July 4-6, 1994, Umhlanga Rocks) (with Wright CJ & Carté E)

9. Modern Group Analysis VI (January 15-20, 1996, Johannesburg, South Africa) (member of the Scientific Committee)

10. Conference in Honour of Marc Feix and his contributions to Physics, Mathematics and Numerical Modelling (June 23-24, 1997, Orléans, France) (member of the Organising Committee and joint editor of the proceedings)

11. International Conference on Systems, Signals, Control and Computers (September 22-24, 1998, Durban, RSA) (member of both the Advisory Board and the International Programme Committee)

12. Symmetry VI (June 23-29, 2003, Kiev, Ukrainia) (member of the Organising Committee)

13. Symmetry VII (June 21-26, 2005, Kiev, Ukrainia) (member of the Organising Committee)

3.4 Conference Proceedings edited

1. Proceedings of the Workshop on Finite Dimensional Integrable Nonlinear Dynamical Systems (World Scientific Press, Singapore, 1988) (with Steeb W-H)

2. Dynamical Systems, Plasmas and Gravitation (Springer-Verlag, Heidelberg, 1999) (with Bouquet SÉ, Rouet J-L & Fijkalow E)

3.5   Guest Editorships

1. Problems of Nonlinear Analysis in Engineering Systems (2005) **11** (1)

2. Journal of Nonlinear Mathematical Physics (2005) **12** (2)