CURRICULUM VITAE

J. D. Gibbon

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1. *Name:* John David Gibbon.
2. *Nationality:* British.
3. *Date of Birth:* 12th January 1949.
4. *Secondary Schooling:* Sept 1st 1960 - July 1967, Stretford Grammar School (Manchester), 8 O-levels and 5 A-levels.
5. *University Education:*

   a) October 1st 1967 - July 1970; Department of Mathematics, University of Birmingham. BSc Degree (2/1) in Mathematical Physics.

   b) August 1970 - Sept 30th 1973; Department of Mathematics, University of Manchester Institute of Science and Technology (UMIST), Manchester, UK. PhD in Mathematics.

Positions held

1. Currently : Senior Research Investigator (SRI) 2011– , Department of Mathematics, Imperial College London.
2. Dean (now called Consul) of the Faculty of Natural Sciences, Imperial College London, 2007–2010.
3. Professor of Applied Mathematics, Imperial College London, 1990–present.
4. Visiting position 2000: Visiting Professor in the Research Institute for Mathematical Sciences (RIMS), University of Kyoto, Japan, July 1st – September 30th 2000.
5. Visiting position 1997 : The Sir Siegmund Warburg Weizmann Professor at the Weizmann Institute of Science, Israel, January 1st - September 30th 1997.
6. Reader in Applied Mathematics, Department of Mathematics, Imperial College London, 1985–1990.
7. Lecturer in Mathematics at Imperial College London, 1980–1985.
8. Lectureship in Mathematical Physics, University College Dublin, 1978–1980.
9. Postdoctoral Research Fellow, UMIST Mathematics Department July 1st–September 30th 1978.
10. Lecturer in Applied Mathematics, Department of Mathematics, University of Newcastleupon-Tyne, September 1st 1977–June 30th 1978.
11. Postdoctoral Research Fellow, University of Manchester Institute of Science and Technology (UMIST) Mathematics Department, 1974–1976.
12. Royal Society European Fellowship held in the Istituto di Fisica Teorica, University of Pavia, Italy, 1973–1974

Activities in the wider mathematical community

1. Chief (Honorary) and founding Editor of the journal *Nonlinearity* (together with David Rand) 1988-93 – a joint venture between the London Mathematical Society and UK Institute of Physics with a Board of 30 Editors.
2. Board Member of *Nonlinearity* Jan 1993–Dec 95.
3. Board Member of *Journal of Mathematical Physics*, Jan 1st 1995–Dec 31st 1998.
4. Isaac Newton Institute for Mathematical Sciences, Cambridge :
   - Principal Organizer of the 6 month programme : *Mathematical aspects of fluid turbulence : where do we stand?* Jan-July 2022.
   - Organizer 6 month programme *From finite to infinite dimensional dynamical systems* July-Dec 1995.
   - Full 6 month attendance at *Topological Fluid Dynamics* 2012.
   - 3 month attendance at *Dynamics of atmospheres and oceans* 1997.
5. Organiser *Royal Society Discussion Meeting: Nov 1984 New developments in the theory and applications of solitons* (jointly with Sir Michael Atiyah FRS and Dr G. Wilson).
6. Member of the Science and Engineering Research Council (SERC) "Nonlinear Systems Research" Grant national assessment Committee 1992.
7. Member of the Science and Engineering Research Council (SERC) "Nonlinear Systems Research" Earmarked studentship national assessment Committee 1992.
8. Member of the Engineering and Physical Sciences Research Council (now EPSRC: old SERC) MSc grant assessment national committee 1994.
9. Chairman of the EPSRC Applied Mathematics Grant National Committee November 1996.
10. Member of the EPSRC Mathematics College 1994-2002.
11. Member of the Philip Leverhulme Prize Panel for Mathematics and Statistics, 2004, 2006 and 2009.
12. Member of the LMS Prize Committee : 2007-10.
13. Member of the Science Foundation of Ireland Mathematics Grant Committee, Spring 2005.

External Examining Positions

1. External examiner : University of Cambridge 1A Maths Tripos, 1992-94.
2. External examiner for Applied Mathematics : University of Warwick, 1998-2000.
3. External examiner for Applied Mathematics : University of Durham, 2001-04.
4. External examiner for Mathematics : University of Limerick, 2001-04.
5. London University Internal Applied Mathematics examiner : Queen Mary University of London, Mathematics Department, 1989-92.
6. External assessor on Professorial appointment committees for Applied Mathematics in other UK universities : Newcastle University, QM University of London, University of Cork, The Open University, University of Limerick & UCD Ireland.

Summary of research interests

1. My first area of interest, beginning as a graduate student in 1970, was in of what is now known as integrable systems (solitons). My postdoc collaborator (J. C. Eilbeck) and I were the first in the UK to work in this area. At the time this was a new and very unusual world in which the implications of the discovery by Zabusky and Kruskal in 1965 of strange particle-like properties of solutions of the KdV equation was only just beginning to be understood. This endeavour had emerged from the general group interest in nonlinear optics but quickly spread to a more general interest in integrable PDEs – hence my first set of papers in these areas (approx numbers 1-40). My first achievement was finding the full N-soliton solution of the sine-Gordon equation (see publn no 5) together with associated equations.

2. By 1985/6 I was ready to move on. I began a collaboration with Charles Doering and Darryl Holm at Los Alamos National Lab which led to several years of work on global attractors in dissipative PDEs, such as the Navier-Stokes (NSEs) and the complex Ginzburg Landau (CGL) equations.

3. Working on the NSEs inevitably pulls one into the world of fluid turbulence, which has been my main research interest in the last 25 years. My focus has been along the lines of trying to understand the regularity properties of both the 2D and 3D NS and Euler equations. Stimulated by my stay at the Isaac Newton Institute's recent turbulence programme (of which I was the Principal Organizer), my two most recent pieces of work are :

   - Active turbulence driven by swarms of bacteria, fish or birds : see paper 131 *An analytical and computational study of the incompressible Toner-Tu Equations* in collaboration with Rahul Pandit's group in IISc Bangalore. The ITT equations are like a fusion of the NS and CGL equations and thus share many their properties.
   - The reconciliation of the multifractal theory of turbulence with the results of NS analysis : see publication 132 *Identifying the mulfractal set on which the energy dissipates in a turbulent Navier-Stokes fluid.*

Publication List (up to Sept 2022)

Papers

132. Identifying the multifractal set on which energy dissipates in a turbulent Navier-Stokes fluid, in submission to PRL, July 2022.
131. An analytical and computational study of the incompressible Toner-Tu Equations (with Kolluru Venkata Kiran, Nadia Bihari Padhan and Rahul Pandit), arXiv:4335411 [physics.flu-dyn] 1 Jun 2022.
130. How to extract a spectrum from hydrodynamic equations (with Dario Vincenzi), J. Nonlin. Sci. **32**:87, 2022. https://doi.org/10.1007/s00332-022-09830-9, arXiv:2112.04923v1.
129. A correspondence between the multifractal model of turbulence and the Navier-Stokes equations (with Berengere Dubrulle), Phil. Trans. R. Soc. A **380** 20210092, 2022. doi.org/10.1098/rsta.2021.0092
128. How close are shell models to the 3D Navier-Stokes equations? (with Dario Vincenzi), Nonlinearity **34** 5821–5843, 2021. doi.org/10.1088/1361-6544/abe096
127. Intermittency, cascades and thin sets in three-dimensional Navier-Stokes turbulence, EPL, **131**, 64001, 2020. (doi.org/10.1209/0295-5075/131/64001)
126. Regularity diagnostics applied to a turbulent boundary layer, December 2018 (with Jane Bae, Robert M Kerr and Adrian Lozano-Duran) ; Stanford CTR Summer Program Report 2018.

125. The Pharmacopoeia Mathematica, The Mathematical Intelligencer, **40**(4), 62–64, 2018. Published on-line 21st August 2018, https://doi.org/10.1007/s00283-018-9806-6
124. Weak & strong solutions of the 3D Navier-Stokes equations & their relation to a chessboard of convergent inverse length scales, J. Nonlin. Sci., **29**(1), 215–228, 2019. https://doi.org/10.1007/s00332-018-9484-8
123. The role of BKM-type theorems in Euler, Navier-Stokes and Cahn-Hilliard-Navier-Stokes analysis (with Anupam Guptab, Nairita Pal and Rahul Pandit) Physica D **376**–**377**, 60–68, 2018.
122. Martin David Kruskal – a memoir, *Biographical Memoirs of Fellows of the Royal Society* (with S. C. Cowley, N. Joshi and M. A. H. MacCallum), **64**, 2018. Published on-line 30 August 2017.DOI: 10.1098/rsbm.2017.0022
121. Integrability of the hyperbolic reduced Maxwell-Bloch equations for strongly correlated Bose-Einstein condensates (with Alexis Arnaudon) ; Phys. Rev. A **36**, 013610, (2017).
120. Lyapunov dimension of elastic turbulence (with E. L. C. VI. M. Plan, A. Gupta & D. Vincenzi), JFM Rapids, **822**, R4, doi:10.1017/jfm.2017.267 (2017).
119. Bounds on solutions of the rotating, stratified, incompressible, non-hydrostatic, three-dimensional Boussinesq equations (with D. D. Holm) ; Nonlinearity **30**, R1R24, (2017).
118. Regularity criterion for solutions of the three-dimensional Cahn-Hilliard-Navier-Stokes equations and associated computations (with Nairita Pal, Anupam Gupta and Rahul Pandit) ; Phys. Rev. E **94**, 063103 (2016).
117. Depletion of Nonlinearity in Magnetohydrodynamic Turbulence : Insights from Analysis and Simulations. (with A. Gupta, G. Krstulovic, R. Pandit, H. Politano, Y. Ponty, A. Pouquet, G. Sahoo, and J. Stawarz), Phys. Rev. E, **93**, 043104 (2016).
116. Nonlinear effects in buoyancy-driven variable density turbulence (with P. Rao and C. P. Caulfield) ; J. Fluid Mech. **810**, 362–377, 2017.
115. High-low frequency slaving and regularity issues in the 3D Navier-Stokes equations, IMA J. Appl. Math. **81**(2), 308–320 (2016).
114. Modal dependency and nonlinear depletion in the 3D Navier-Stokes equations ; Recent Progress in the Theory of the Euler and Navier-Stokes equations, (eds. James C. Robinson, José L. Rodrigo, Witold Sadowski and Alejandro Vidal-López), London Mathematical Society Lecture Note Series, **430**, 57–76, Cambridge University Press, 2016.
113. Regimes of nonlinear depletion and regularity in the 3D Navier-Stokes equations, (with D. Donzis, R. M. Kerr, A. Gupta, R. Pandit & D. Vincenzi), Nonlinearity, **27**, 1-19, 2014.
112. Vorticity moments in four numerical simulations of the $3D$ Navier-Stokes equations (with D. Donzis, R. M. Kerr, A. Gupta, R. Pandit & D. Vincenzi) 2013 : J. Fluid Mech., **732**, pp. 316–331, 2013.
111. The three-dimensional Euler equations with a passive scalar : a road to blow-up (with E. S. Titi) : J. Non. Sci., **23** (issue 6), 993–1000, (2013).
110. Enstrophy bounds and the range of space-time scales in the hydrostatic primitive equations (with D. D. Holm), Phys. Rev. E **87**, 031001(R) (2013).
109. Stretching and folding processes in the 3D Navier-Stokes and Euler equations (with D. Holm) : Procedia IUTAM, **9**, 25–31, (2013). (Proceedings of IUTAM Symposium on the understanding of common aspects of extreme events in fluids, Dublin, 2012).
108. Dynamics of scaled vorticity norms for the three-dimensional Navier-Stokes and Euler equations, Procedia IUTAM, **7**, 39–48, (2013). Proceedings of IUTAM Symposium Topological Fluid Dynamics II, Cambridge, 2012.
107. Quasi-conservation laws for compressible 3D Navier-Stokes flow (with D. D. Holm) ; Phys. Rev. E **86**, 047301 2012.

106. Conditional regularity of solutions of the three dimensional Navier-Stokes equations & implications for intermittency : J. Math. Phys., **53**, 115608, (2012).
105. Sharp constants in the Sobolev embedding theorem & a derivation of the Brezis-Gallouet interpolation inequality (M. V. Bartuccelli & J. D. Gibbon) : J. Math. Phys., **52**, 093706 (2011).
104. A hierarchy of length scales for solutions of the three-dimensional Navier-Stokes equations; Comm Math. Sci., **10**, No. 1, pp. 131–136, 2011.
103. Stretching & folding diagnostics in solutions of the three-dimensional Euler & Navier-Stokes equations, (with D. D. Holm) : *Mathematical Aspects of Fluid Mechanics*, pgs 201—220, edited by J. C. Robinson, J. L. Rodrigo & W. Sadowski, Cambridge University Press 2012.
102. The gradient of potential vorticity, quaternions and an orthonormal frame for fluid particles (with D. D. Holm), Geophysical and Astrophysical Fluid Dynamics ; ISSN 0309-1929 print/ISSN 1029-0419 online, 2010 Taylor & Francis.
101. The dynamics of the gradient of potential vorticity (with D. D. Holm), J. Phys. A: Math. Theor. **43** (2010) 172001.
100. Extreme events in solutions of hydrostatic and non-hydrostatic climate models, (with D. D. Holm) : Phil. Trans. R. Soc. A 28 March 2011, **369**, no. 1939, 1156-1179 (arXiv:0902.0066v3 [nlin.CD])
99. Regularity and singularity in solutions of the three-dimensional Navier-Stokes equations, Proc. Royal Soc A, **466**, 2587-2604, 2010. published online 17 March 2010, doi: 10.1098/rspa.2009.0642 (arXiv:0905.0344v3 [nlin.CD])
98. Kähler geometry and Burgers vortices (with I. Roulstone, B. Banos & V. N. Roubtsov), Proc. Ukrainian Natl. Acad. Math. **16**, no. 2, (2009) 303–321.
97. A geometric interpretation of coherent structures in Navier-Stokes flows (with I. Roulstone, B. Banos & V. N. Roubtsov): Proc. R. Soc. A, **465**, (2009) 2015-2021.
96. Estimating intermittency in three-dimensional Navier-Stokes turbulence; Journal of Fluid Mechanics, **625** (2009), 125-133.
95. The three-dimensional Euler equations: singular or non-singular? (with M. Bustamante and R. M. Kerr), A contribution to *Nonlinearity's* 'Open Problems' series; Nonlinearity **21**, (2008) T123–T129.
94. Estimates for the LANS-α, Leray-α & Bardina models in terms of a Navier-Stokes Reynolds number (with D. D. Holm); Indiana University Math. Journal, **57**, No. 6 (2008), 2761–2773.
93. Quaternions and ideal flows (with H. Eshraghi), J. Phys. A: Math. Theor. **41**, (2008) 344004.
92. The three-dimensional Euler equations: Where do we stand? Survey Lecture at the meeting *Euler equations 250 years on*, – Proceedings of an international conference Aussois, France, 18-23 June 2007 : edited by Gregory Eyink, Uriel Frisch, René Moreau and Andre Sobolevski, Physica D **237**, (2008) 1894–1904.
91. Ortho-normal quaternion frames, Lagrangian evolution equations and the three-dimensional Euler equations, Russian Math. Surveys **62:3** 1–26, (Uspekhi Mat. Nauk **62:3** 47–72, 2007. DOI 10.1070/RM2007v062n03ABEH004411
90. Lagrangian analysis of alignment dynamics for isentropic compressible magnetohydrodynamics (with D. D. Holm), New Journal of Physics **9**, 292–306, (2007).
89. Lagrangian particle paths & ortho-normal quaternion frames (with D. D. Holm), Nonlinearity **20,** 1745-1759, 2007.
88. Estimates for the two-dimensional Navier-Stokes equations in terms of the Reynolds number (with G. A. Pavliotis) J. Math. Phys, **48,** 065202, 2007.
87. Length-scale estimates for the LANS-α equations in terms of the Reynolds number, (with D. D. Holm), Physica D, **220**, 69–78, 2006; doi:10.1016/j.physd.2006.06.012

86. Quaternions and particle dynamics in the Euler fluid equations, J. D. Gibbon, D. D. Holm, R. M. Kerr and I. Roulstone, Nonlinearity **19**, 1969-1983, 2006.
85. Exponentially growing solutions in homogeneous Rayleigh-Bénard convection, (with E. Calzavarini, C. R. Doering, D. Lohse, A. Tanabe, and F. Toschi), Phys. Rev. E **73**, 035301, 2006.
84. Cluster formation in complex multi-scale systems (with E. Titi); Proc Royal Soc., **461**, 3089–3097, 2005. DOI ref: dx.doi.org/10.1098/rspa.2005.1548
83. Intermittency & regularity issues in three-dimensional Navier-Stokes turbulence (with C. R. Doering). Arch. Rat. Mech. Anal., **177**, 115–150, 2005.
82. A Bound on Mixing Efficiency for the Advection–Diffusion Equation (with J-L. Thiffeault & C. R. Doering); Journal of Fluid Mechanics, **521**, 105-114, 2004.
81. Exact, infinite energy, blow-up solutions of the three-dimensional Euler equations (with D. R. Moore & J. T. Stuart), Nonlinearity, **16**, 1823-1831, 2003.
80. Intermittency is solutions of the three-dimensional Navier-Stokes equations (with C. R. Doering), J. Fluid Mech., **478**, 227-235, 2003.
79. A quaternionic structure in the three-dimensional Euler and ideal MHD equations, Physica D, **166**, 17-28, 2002.
78. Bounds on moments of the energy spectrum for weak solutions of the 3D Navier-Stokes equations (with C. R. Doering), Physica D, **165**, 163-175, 2002.
77. Singularity formation in a class of stretched solutions of the equations for ideal MHD (with K. Ohkitani), Nonlinearity, **14**, 1239-1264, 2001.
76. Numerical study of singularity formation in a class of Euler and Navier-Stokes flows (with K. Ohkitani), Physics of Fluids, **12**, 3181-3194, 2000.
75. Scale separation and regularity of the Navier-Stokes equations (with C. R. Doering) in *Intermittency in Turbulent Flows and other Dynamical Systems* ed. J. C. Vassilicos, Cambridge University Press, Isaac Newton Institute Series, 2000.
74. "Stretching & compression of vorticity in the 3D Euler equations" (with B. Galanti & R. Kerr), in *Turbulence structure and vortex dynamics*, pp 23-34, eds J. C. R. Hunt and J. C. Vassilicos, Cambridge University Press 2000.
73. Vorticity alignment results for the 3D Euler and Navier-Stokes equations, Trends in Mathematics, (Birkhauser) pp 25-32, 1999.
72. Dynamically stretched vortices as solutions of the 3D Navier-Stokes equations (with A. S. Fokas and C. R. Doering), Physica D, **132**, 497-510, 1999.
71. Extending Lundgren's transformation to construct stretched vortex solutions of the 3D Navier-Stokes and Euler equations, Proceedings of the NCAR June 16th-19th 1998 conference, published in *Developments in Geophysical Turbulence*, Kluwer.
70. A logarithmic $3d$ Euler inequality (with M. Heritage & J. Gibbons); Phys. Fluids, **9**(2), 471-472, 1997.
69. Angular dependence and growth of vorticity in the 3D Euler equations (with M. Heritage), Phys. Fluids, A, **9**, 901-909, 1997.
68. Vorticity alignment results for the $3D$ Euler and Navier-Stokes equations (with B. Galanti and M. Heritage), Nonlinearity, **10**, 1675-1695, 1997.
67. Attractor dimension and small length scale estimates for the $3d$ Navier-Stokes equations (with E. S. Titi): Nonlinearity, **10**, 109-119, 1997.
66. Dimensions of attractors and small length scales in solutions of the two- and three-dimensional Navier-Stokes equations, in *Advances in Fluid Mechanics "Nonlinear Instability Analysis"* pgs 1-42, Computational Mechanics Publications, (ed. L. Debnath & S. R. Choudhury 1997).
65. Length scales in solutions of the complex Ginzburg Landau equation (with M. V. Bartuccelli and M. Oliver); Physica **89D**, 267-286, 1996.

64. A voyage around the Navier-Stokes equations: Physica **92D**, 133-139, 1996
63. "Analysis of the $2d$ and $3d$ Navier-Stokes equations": in *Nonlinear Mathematics and its applications* edited by P. J. Aston, Cambridge University Press, pp. 121-146, 1996 (Lectures given at the EPSRC Nonlinear Mathematics Spring School, Surrey, 1995).
62. A conjecture regarding local behaviour of vorticity in the $3d$ incompressible Navier-Stokes equations: Physics Letters **A203**, 181-188, 1995.
61. Estimates of the the shape and dimension of the Lorenz attractor: Dynamics and Stability of Systems, **10**, 255-268, 1995, (with C. R. Doering).
60. Length scales and ladder theorems for $2d$ and $3d$ convection: Nonlinearity, **8**, 81-92, 1995.
59. Weak and strong solutions of the CGL equation: Physica **71D**, 285-318, 1994 (with C. D. Levermore and C. R. Doering).
58. Derivation of $3d$ Navier-Stokes length scales from a result of Foias, Guillope and Temam; Nonlinearity **7**, 245-252, 1994.
57. Length scales in solutions of the Navier-Stokes equations: Nonlinearity **6**, 549-568, 1993 (with M. Bartuccelli, C. R. Doering and S. J. Malham).
56. Lattice methods and the pressure field for solutions of the $3d$ Navier-Stokes equations: Nonlinearity, **6**, 79-91, 1993 (with S. J. A. Malham and M. V. Bartuccelli).
55. Ladder theorems for the $2d$ and $3d$ Navier-Stokes equations on a finite periodic domain (with M. Bartuccelli and C. R. Doering), Nonlinearity **4**, 531-542, 1991.
54. Note on the Constantin-Foias-Temam attractor dimension estimate for two-dimensional turbulence (with C. R. Doering), Physica **48D**, 471-480, 1991.
53. Coupled NLS equations for counter-propagating waves for systems with reflection symmetry (with E. Knobloch), Phys. Lett. **154**(7-8), 353–356, 1991.
52. On the possibility of soft and hard turbulence in the complex Ginzburg Landau equation (with P. Constantin, C. R. Doering, M. Gisselfalt and M. Bartuccelli), Physica **44D**, 421-444, 1990.
51. Finite dimensionality in the complex Ginzburg Landau equation, (with C. R. Doering and D. D. Holm) in *Nonlinear evolution equations: integrability and spectral methods* , edited by A. Degasperis, A. P. Fordy and M. Lakshmanan, Manchester University Press, 1990 pp. 462-476.
50. "Why the NLS equation is simultaneously a success, a failure and a mediocrity in the theory of nonlinear waves": in *Nonlinear evolution equations: integrability and spectral methods* , edited by A. Degasperis, A. P. Fordy and M. Lakshmanan, Manchester University Press, 1990.
49. Finite dimensional attractor in the laser equations (with P. Constantin and C. Foias); Nonlinearity **2**, 241-269, 1989.
48. Low dimensional behaviour in the CGL equation: (with C. R. Doering, D. D. Holm and B. Nicolaenko), Contemporary Mathematics **99**, 117-141, 1989.
47. Hard turbulence in a finite dimensional dynamical system (with M. Bartuccelli, P. Constantin, C. R. Doering and M. Gisselfalt), Physics Letts **142A**, 349-356, 1989.
46. Lax pairs, Bäcklund transformations & special solutions for ordinary differential equations (with A. C. Newell, M. Tabor & Y. B. Zheng), Nonlinearity, **1**, 481-490, 1988.
45. Finite dimensionality in the complex Ginzburg Landau equation, (with C. R. Doering, D. D. Holm and B. Nicolaenko), Contemporary Mathematics, AMS, Providence, Rhode Island **99**, 117-142, 1989 (edited by B. Nicolaenko).
44. Finite dimensionality in the laser equations in the good cavity limit (with J. N. Elgin, C. R. Doering and D.D. Holm), Physics Letts, **129A**, 310-5, 1988.
43. Low dimensional behaviour in the CGL equation: Nonlinearity 1, 279-309, 1988 (with C.R. Doering, D. D. Holm and B. Nicolaenko).
42. Finite upper bound on the Lyapunov dimension in the CGL equation, (with C. Doering, D.D. Holm and B. Nicolaenko), Phys. Rev. Lett., **59**, 2911-4, 1987.

41. Aspects of the Painlevé property for partial differential equations (with M. Tabor: Physica D, **18**, 180-9, 1986.
40. Theoretical and computational study of the soliton laser (with J.N. Elgin, F. If, P. Christiansen & O. Skovgaard), Optics Comm., **57**, 350, 1986.
39. A numerical model of the soliton laser (with J.N. Elgin, F. If, P. Christiansen & O. Skovgaard), Physica D, **23**, 362, 1986.
38. "Modulational Instabilities in homogeneously broadened lasers", (with J. N. Elgin, J. Molina-Garza and D. Wood) pp.246 in *Nonlinear phenomena and chaos* (ed. S. Sarkar) Adam Hilger, 1986.
37. Spatial effects & the Eckhaus instability in the laser & Lorenz equations (with J. N. Elgin, C. Holmes, J. Molina-Garza & N. Readwin, Physica D, **23**, 19-26, 1986.
36. On the one- and two-dimensional Toda lattices & the Painlevé property (with M. Tabor), J. Math Phys., **26**, 1956-60, 1985.
35. The Painlevé property & Hirota's method (with P. Radmore, D. Wood and M. Tabor), Stud. Appl. Math., **72**, 39-63, 1985.
34. Hirota's method and the Painleve property: (with M. Tabor) page 55 "Dynamical Problems in Soliton systems" (ed. S. Takeno) Springer 1985.
33. A survey of the origins and physical importance of soliton equations; Phil Trans Royal Soc Lond., 315A, 335-65, 1985. (Also published by the Royal Society as a book 1985 New developments in the theory and applications of solitons, edited by J. D. Gibbon, G. Wilson and Sir Michael Atiyah FRS).
32. The real and complex Lorenz equations and their relevance to physical systems, Physica D, **7**, 135-150, 1983 (Special issue, *Order in Chaos*).
31. Collapse in the n-dimensional NLS equation - a parallel with Sundman's theorems in the N-body problem (with F.H. Berkshire): Studies in Appl. Math., **69**, 229-62, 1983.
30. Dispersive instabilities in nonlinear systems: The real and complex Lorenz equations; Article in "Chaos and Order in Nature", pages 92-101, Springer Series in Synergetics, editor H. Haken, 1982.
29. Amplitude equations at the critical points of unstable dispersive physical systems (with M.J. McGuinness); Proc. Roy. Soc. London, 1981, **A377**, 185-219.
28. A study of the effect of mode truncation on an exact periodic solution of an infinite set of Lorenz equations (with M. Booty and A. C. Fowler); Phys. Letts., **87A**, 261-5, 1982.
27. The complex Lorenz equations (with A.C. Fowler and M.J. McGuinness); Physica D, (Nonlinear Phenomena), **4D**, 139, 1982.
26. The real and complex Lorenz equations in rotating fluids and lasers (with M.J. McGuinness); Physica D, (Nonlinear Phenomena), **5D**, 108-22, 1982.
25. The real and complex Lorenz equations; Proceedings of the Royal Irish Academy **83A**, 17-22, 1983 - Proc. of the Nonlinear Wave conference held in Trinity College Dublin, May 1980.
24. A general derivation of the Lorenz equations for some unstable dispersive physical systems (with M. J. McGuinness); Phys. Letts., **77A**, 259-63, 1980.
23. Nonlinear focussing and the Kelvin Helmholtz instability (with M. J. McGuinness); Physics Letts., **77A**, 118-21, 1980.
22. An example of soliton behaviour in a rotating baroclinic fluid (with I. N. James and I.M. Moroz); Proc. Roy. Soc. London, **A367**, 219-37, 1979.
21. The sine-Gordon equation as a model for a rapidly rotating baroclinic fluid (with I.N. James and I.M. Moroz); Physics Scripta special issue on solitons and their applications to science and technology; **20**, 402-408, 1979.

20. The prolongation structure of a class of nonlinear evolution equations (with R.K. Dodd); Proc. Roy. Soc. London, **A359**, 411-33, 1978.
19. Correspondence between classical $\lambda\phi^4$, double and single sine-Gordon equations for 3-dimensional solitons (with N.C. Freeman and R.S. Johnson); Phys. Letts., **65A**, 380-2, 1978.
18. Multiple soliton-like solutions of nonlinear Klein-Gordon equations in three dimensions (with N.C. Freeman and A. Davey); J. Phys. A, **11**, L93-96, 1978.
17. The prolongation structure of a higher order KdV equation (with R. K. Dodd); Proc. Roy. Soc. London, **A358**, 287-96, 1977.
16. Wobbling & leapfrogging in SIT (with R. K. Bullough. S. Duckworth, P. J. Caudrey, H. M. Gibbs, B. Bölger & L. Baede) ; Optics Comm., **18**, 200, 1976.
15. Unusual behaviour in the SIT of $Q(2)$ vibration-rotation transitions (with S. Duckworth, R.K. Bullough and P.J. Caudrey); Phys. Letts., **57A**, 19-22, 1976.
14. A new hierarchy of Korteweg-de Vries equations (with R.K. Dodd and P.J. Caudrey); Proc. Roy. Soc. London **A351**, 407-22, 1976.
13. A modified long wave equation with an exact 2-soliton solution (with R.K. Dodd and J.C. Eilbeck); J. Phys. A, **9**, 1976.
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