Curriculum Vitae

Mark Joseph McGuinness

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Present Position:

Emeritus Professor
School of Mathematics and Statistics
Victoria University of Wellington (VUW)
PO Box 600, Wellington.

I commenced work as a Senior Lecturer in the Mathematics Department at VUW in 1991. I was appointed Professor of Applied Mathematics at VUW in 2015. I retired in October 2021, and accepted a position as Adjunct Professor of Applied Mathematics at VUW from then until 2023, when I was offered the position of Emeritus Professor.

Academic Record:

Ph.d. 1978, Physics Department, Canterbury University, New Zealand.
B.Sc. Hons. (First Class) in Physics, Canterbury University, New Zealand, conferred in 1975.
University Junior and Senior Scholarships, 1971, 1974
IBM New Zealand Scholarship, 1971
UGC Post-Graduate Scholarship, 1975
Charles Cook, Warwick House, Memorial Scholarship, 1975

Thesis Students Supervised:

Primary Supervisor:
Lata Paea, MSc, 2024. *Mathematical Models Of Microwaves Detecting Moisture In Bauxite Ore.*
Emma Greenbank, PhD, 2021. *Modelling Surtseyan Ejecta.*
Nitay Ben Shachar, MSc, 2021. *Thermal Oscillations in Sea Ice and Soils.*
Emma Greenbank, MSc, 2016. *Modelling Surtseyan Ejecta.*
Harpreet Singh, MSc, 2013. *Erupting Dusts.*
Jonathan Crook, PhD, 2010. *Ice Growth and Platelet Crystals in Antarctica.*
Sione Paea, MSc with Merit, 2008. *Coal Volatilisation Distribution.*
Nigel Holland, MSc, 2008. *The Dynamics of Coupled Oscillators.*
Alysha Nickerson, MSc, 2007. *Modelling Solar Heating of Sea Ice.*
Young Hong, PhD, 2005. *Cardiac Control Models.*
Christine Cameron, MSc, 1997. *The Fractal Dimension of New Zealand Fault Lines.*
Irene Pestov, PhD, 1996. *Mathematical Modelling of Two-Phase Geothermal Reservoirs.*
Philip Moir, Dip. Applied Science, 1994. *A Model for Parasitic Infection in Ruminants.*

Second Supervisor:
Benjamin Carson, MSc, 2020. *Investigation of the Rotokawa Geothermal System and Feasibility of Supercritical Fluid Production within the TVZ through Supercritical TOUGH2 Numerical Modeling.*
Mohammad Ayat, PhD, 2014. *The Cochlear Microphonic.*
Mohammed Daher, PhD, 2013. *Dual Numbers and Invariants of the Euclidean Group.*
Natalie Robinson, MSc, 2005. *An oceanographic study of the cavity beneath the McMurdo Ice Shelf, Antarctica.*
Daniel Pringle, PhD, 2004. *Thermal Conductivity of Sea Ice and Antarctic Permafrost.*

Previous Positions:

1983-1991 Research Scientist, Mathematical Physics Section, Applied Mathematics Division, DSIR, Wellington NZ.

1981-1983 Instructor in Applied Mathematics at the California Institute of Technology, Pasadena, California, U.S.A.

1978-1981 Post-Doctoral Research Fellow (awarded by the Education

Department, Dublin) at the Mathematical Physics Department, University College Dublin, Ireland.

Industry Links
In most of the years from 1996 to the present time, I have been invited to Moderate at the Mathematics and Industry Study Group held in Australia or New Zealand; from 2009 to now I have been invited to help in a similar role at the European Study Groups with Industry held each year at the University of Limerick. I have consulted for the New Zealand geothermal divisions of Mighty River Power and Contact Energy, for the Phillippines geothermal company EDC, and for the Indonesian geothermal group called Pertamina, on geothermal reservoir modelling and geothermal wellbore modelling. I have written code that simulates two-phase flow up a geothermal wellbore, and I have publications linked to this interest. This code is being used by geothermal energy companies EDC and Pertamina.

Research
I enjoy using mathematics and differential equations to model and solve complicated real-world problems, especially when someone from industry, medicine, or the geophysical sciences is interested in the results. I enjoy working on heat and mass transport problems, nonlinear problems requiring asymptotic methods to approximate solutions analytically, and problems with good clinical or lab data to validate the model. I derive particular pleasure from using mathematics to take something that appears to be very complicated, and to reduce that problem to the point that it is essentially understood and solved.

Esteem
I have an outstanding reputation internationally as a leader in Study Groups, initiated by academics from Oxford in 1968 (`http://www.maths-in-industry.org/how/`). Study Groups represent the pinnacle of industrial applied maths efforts around the world, and provide a vital, practical outreach connection between university and industry. This leadership is demonstrated by my position as Convenor of the Mathematics in Industry NZ Reference Group during 2017-2019, and by Moderating a challenge presented at one or more Study Groups around the world in each year since 1996. Moderation requires skills in overseeing, understanding, and coordinating the intensive math brainstorming sessions that take place during a Study Group week, then presenting results and writing a report on the progress made. A measure of the impact of these Study Groups is the number of companies that come back year after year. Another measure is the publications arising out of study group problems solved. I have been repeatedly invited back to Moderate

Study Groups in Australia, NZ, and Europe.

I was appointed Director of the NZ Maths in Industry Study Group (MINZ) Reference Group 2017-2019, with over-arching responsibility for the future of these Study Groups in NZ. I was Chair of ANZIAM (the Australia and New Zealand Industrial and Applied Mathematics group) 2018-2020, and Deputy Chair of ANZIAM in 2017 and 2020.

My reported research outputs are mostly in A-rated refereed international journals, and in a wide variety of disciplines, reflecting the inter-disciplinary nature of the applied maths I do. I work with many collaborators, sometimes in large teams. On 11 Sep 2021, together with colleagues, I made it into the NY Times (How Math Solved the Case of the Volcanic Bombs That Didn't Explode, also shared by the NZ Herald).

I served as Executive Associate Editor for the Journal of Engineering Mathematics from 2009 to 2021: `http://www.springer.com/physics/classical+continuum+physics/journal/10665`. I am a Fellow of the NZ Mathematical Society.

My h-index is 25:
`scholar.google.co.nz/citations?user=jtJoU08AAAAJ&hl=en&oi=ao`
my i10 index (number of publications with at least ten citations) is 50, and I have a total of over 2,300 citations, with more than 400 new citations in the last five years — Google Scholar. I have been a plenary invited speaker at a number of international conferences, including more recently ECMI 2021, NZMASP2021, and AustMS 2022.

Publications

Total Publications: **155**

Total number of publications accepted for publication in refereed journals, book chapters, and refereed conference proceedings: **119**
(Consisting of 68 refereed and published journal articles and book chapters, 44 refereed conference proceedings and 6 refereed reports)

One book published: Chaos (Springer, 2019).

Total number of other reports: **35**

Refereed Publications with sole authorship: **25**

Books

A.C. Fowler and **M.J. McGuinness**, Chaos, Springer, 2019.
https://doi.org/10.1007/978-3-030-32538-1

Refereed Articles published in International Journals & Book Chapters

1. Paea S, Bulivou, G., Mansour, A., Katsanos, C., & McGuinness, M.J. Racial Inequality in Engineering Education: A Taxonomy of Challenges Faced by Female Engineering Students in the Pacific Region. Accepted for publication in the European Journal of Engineering Education, January 2026. 21 pages.

2. Paea LI, Paea S, McGuinness MJ. Detecting moisture in bauxite using microwaves. The ANZIAM Journal, Vol. 65(4) (2023) 308–346. Published online 2024: doi:10.1017/S1446181124000026. Open access.

3. A.C. Fowler and **Mark McGuinness**, Bursting Solutions of the Rössler Equations, in the ANZIAM Journal, 10 August 2023. Published as FirstView: https://doi.org/10.1017/S144618112300010X, this is open access.

4. Lata I. Paea, Sione Paea, and **Mark McGuinness**, Modelling Microwaves in Bauxite, The ANZIAM Journal, Vol. 65 (2023) pp.111-134. Open access, doi:10.1017/S144618112300007X

5. Edward J. Bissaker, Ognjen Orozovic, Michael H. Meylan, Fillipe Georgiou, Tomas J. Marsh, James M. Hill, **Mark J. McGuinness**, Winston L. Sweatman, Ngamta Thamwattana. MISG2021: Pneumatic Conveying, in the proceedings of the 2021 Mathematics in Industry Study Group. ANZIAM Journal, Vol. 63, pp.M6–M32, 2023.
DOI: 10.21914/anziamj.v63.16615. http://journal.austms.org.au/ojs/index.php/ANZIAMJ/article/view/16615 [2023-05-11]

6. P. Broadbridge, S. Caldwell, T. Marsh, **M. McGuinness**, O. Orozovic, D. I. Pontin, A. Raboonik, and K. Stevens. Role of vibration in solid-liquid separation using a vacuum belt filter, in the Proceedings of the 2022 Mathematics and Statistics in Industry Study Group, MISG-2022. Eds N. Thamwattana, M. Meylan, & A.J. Roberts. ANZIAM Journal, Vol. 64, pp. M20–M54, 2023. https://doi.org/10.21914/anziamj.v64.17561

7. **M. J. McGuinness**, B. J. Cox, B. Kalyanaraman, K. B. Kiradjiev, R. Gonzalez-Farina, C. Z. W. Hassell Sweatman, Lindon Roberts,

D. I. Pontin, Edward J. Bissaker, S. K. Irvine, D. R. Jenkins, I. J. Taggart. *Furnace vestibule heat transport models*, in the Proceedings of the 2020 Mathematics and Statistics in Industry Study Group, MISG-2020, Eds. Ngamta Thamwattana, Mike Meylan, and A.J. Roberts. ANZIAM Journal Vol. 62, pp.M112–M155, February 2023. DOI: 10.21914/anziamj.v62.16642 `http://journal.austms.org.au/ojs/index.php/ANZIAMJ/article/view/16642` [2023-02-28]

8. **Mark McGuinness**, Sean Bohun, Vincent Cregan, William T. Lee, Jeff Dewynne, Gary O'Keeffe, and Tuoi Vo, *Measuring Moisture in Bauxite with Microwaves*, in the *Proceedings of the Forum "Math-for-Industry" 2019 — Mathematics for the Primary Industries and the Environment*, Eds. Robert McKibbin, Graeme Wake, & Osamu Saeki, in the series *Mathematics for Industry*, Vol. 36, pp.13–64 (2022) (softcover: Sep 2023). Springer Nature, Singapore. `https://doi.org/10.1007/978-981-19-1154-5`

9. Emma Greenback, **Mark J. McGuinness**, C. Ian Schipper, *A theoretical model of Surtseyan bomb fragmentation*, Proc. Roy. Soc. Lond., A., Vol. 477, Issue 2253, September 2021, 22 pages. `https://doi.org/10.1098/rspa.2021.0166` `http://arxiv.org/abs/2108.07997`

10. A.C. Fowler and **M.J. McGuinness**, *The size of Mandelbrot bulbs*, Chaos, Solitons & Fractals, X 3 (2019) 10019. `https://doi.org/10.1016/j.csfx.2019.100019`

11. Stefanie Gutschmidt, **Mark McGuinness**, William Munn, James Hannam, Emma Greenbank, Soomin Jeon, Chang-Ock Lee, Celia Kueh, Tony Gibb, Ben Goodger, Andrew McIntyre. *Fast accurate multi-key weight measurement*, ANZIAM Journal, **58** (2018) pp. M328–M364. `http://journal.austms.org.au/ojs/index.php/ANZIAMJ/article/view/12222`

12. Sione Paea, **Mark McGuinness**. *Higher Order Approximations to Coal Pyrolysis Distribution*, Journal of Sustainable Mining **17** (2018) 76–86. `https://doi.org/10.1016/j.jsm.2018.03.002`

13. Kate E. Turner, Inga J. Smith, Jean-Louis Tison, Véronique Verbeke, **Mark McGuinness**, Malcolm Ingham, Ross Vennell, Joe Trodahl. *Sea ice growth rates from tide-driven visible banding*, Journal of Geophysical Research: Oceans (2017) 122. DOI: 10.1002/2016JC012524

14. Tim G. Myers, Vicent Ribas Ripoll, Anna Saez de Tajada, Sarah L . Mitchell, **Mark J. McGuinness**, *Modelling the cardiovascular system for*

assessing the blood pressure curve, Mathematics-in-Industry Case Studies (2017) 8:2 pp.1–16. DOI: 10.1186/s40929-017-0011-1

15. D. Mitsotakis, C. Synolakis, **M. McGuinness**, *A Modified Galerkin / Finite Element Method for the numerical solution of the Serre-Green-Naghdi system*, Int. J. Numer. Meth. Fluids, 2017; **83**:755–778. Also published online in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/fld.4293

16. Melanie E. Roberts, **Mark McGuinness**, Xing Ju Lee, Bill Whiten, *Modelling the Probable Maximum Precipitation for Large Catchments*, ANZIAM J. **57**, M205–M236, 2016. Part of the Proceedings of the 2015 Mathematics and Statistics in Industry Study Group, editors Troy Farrell & A.J. Roberts, doi: 10.21914/anziamj.v57i0.10274, `http://journal.austms.org.au/ojs/index.php/ANZIAMJ/article/view/10274`

17. Tuoi T.N. Vo, **Mark McGuinness**, Alan F. Hegarty, Stephen B.G. O'Brien, Kevin O'Sullivan and Sandra Healy, *Detecting heart rate while jogging: blind source separation of gait and heartbeat* , Mathematics-in-Industry Case Studies, 2016, 7:2. DOI: 10.1186/s40929-016-0004-5 URL: http://www.micsjournal.com/content/7/1/2 open access via Springer Nature SharedIt initiative: https://rdcu.be/6q92

18. **M.J. McGuinness**, E. Greenbank, and C.I. Schipper, *Modelling vapour transport in Surtseyan bombs*, J. Volc. and Geothermal Res. **318**: 103-113, 15 May 2016. ISSN 0377-0273, `http://doi.org/10.1016/j.jvolgeores.2016.03.017`. `http://www.sciencedirect.com/science/article/pii/S0377027316300294`.

19. **M.J. McGuinness**, N. Sibanda, and M. Welsh, *Modeling Acute Rheumatic Fever*, Mathematical Population Studies, **22** (2015) 187–208. DOI:10.1080/08898480.2014.925352

20. **M. J. McGuinness** & H. Singh. *Modelling the Initiation of Dust Eruptions*. J. Volc. and Geothermal Res. **299** (2015) 54–67. `http://authors.elsevier.com/sd/article/S0377027315001237` DOI: 10.1016/j.jvolgeores.2015.04.008

21. **M. J. McGuinness**, L. B. Cribbin, H. F. Winstanley, & A. C. Fowler. *Modelling spatial oscillations in soil borehole bacteria.* Jour. Theor. Biology, **363** 74–79. December 2014. DOI: 10.1016/j.jtbi.2014.08.017 `http://www.sciencedirect.com/science/article/pii/S002251931400472X`

22. M. Ayat, P.D. Teal & **M. McGuinness**, *An integrated electromechanical model for the cochlear microphonic*, Biocybernetics & Biomedical Eng. **34** No. 4 (2014) 206–219.

23. **M.J. McGuinness**, *Correct Energy Conservation in Geothermal Wellbore Simulation*, Geothermics **51** (2014) 429–433. `http://dx.doi.org/10.1016/j.geothermics.2014.03.007` and *Correct Energy Conservation in Geothermal Wellbore Simulation - Corrigendum* Geothermics **51** (2014) 429–433. DOI:10.1016/j.geothermics.2014.03.007

24. A.C. Fowler, H.F. Winstanley, **M.J. McGuinness**, and L.B. Cribbin, *Oscillations in Soil Bacterial Redox Reactions*, J. Theor. Biol., **342** (2014) 33–38.

25. **M.J. McGuinness**, *Feedpoint viscosity in geothermal wellbore simulation*, Geothermics, **50** (April 2014) 24–29. DOI: 10.1016/j.geothermics.2013.07.007 `http://www.sciencedirect.com/science/article/pii/S0375650513000552`

26. **M.J. McGuinness**, B. Scheu, and A.C. Fowler, *Explosive fragmentation criteria and velocities for vesicular magma*, J. Volc. and Geothermal Res., 237–238 (2012) 81–96. `http://dx.doi.org/10.1016/j.jvolgeores.2012.05.019` or `http://www.sciencedirect.com/science/article/pii/S0377027312001576`

27. W.L. Sweatman, S.I. Barry and **M. McGuinness** (2012) *Heat transfer during annealing of steel coils*, in M. Günther, A. Bartel, M. Brunk, S. Schöps, M. Striebel (eds.) *Progress in Industrial Mathematics at ECMI 2010*, Mathematics in Industry **17**, Springer Berlin Heidelberg, pp. 303–309, DOI: 10.1007/978-3-642-25100-9_35

28. H.F. Winstanley, M. Chapwanya, **M.J. McGuinness**, and A.C. Fowler, *A Polymer-solvent model of biofilm growth*, Proc. Roy. Soc. Lond. A., **467, no. 2129** (2011) 1449–1467. doi: 10.1098/rspa.2010.0327

29. A. Korobeinikov, A. Kovacec, **M.J. McGuinness**, M. Pascoal, A. Pereira and S. Vilela, *Optimizing the profit from a complex cascade of hydroelectric stations with recirculating water*, Mathematics-in-Industry Case Studies Journal, **Vol. 2**, pp.111–133 (2010). `http://www.micsjournal.ca/index.php/mics/article/viewFile/25/24`

30. A.C. Fowler, B. Scheu, W.T. Lee, & **M.J. McGuinness**, *A theoretical model of the explosive fragmentation of vesicular magma*, Proc. Roy. Soc.

Lond., A., March 8, 2010 **466:** 731–752; published online before print November 3, 2009, doi:10.1098/rspa.2009.0382

31. **M.J. McGuinness**, M.J.M. Williams, P.J. Langhorne, C. Purdie, & J. Crook, *Frazil Deposition Under Growing Sea Ice*, Journal of Geophysical Research **114**, C07014, doi:10.1029/2007JC004414 (2009).

32. **M.J. McGuinness**, *Modelling Sea Ice Growth*, ANZIAM Journal **50** (2009) 306–319. doi:10.1017/S1446181109000029.

33. P.E. McSharry, **M.J. McGuinness**, & A.C. Fowler, *Confronting a cardiovascular system model with heart rate and blood pressure data.* Computers in Cardiology **32** pp. 587–590, 2005.

34. A.C. Fowler & **M.J. McGuinness**, *A delay recruitment model of the cardiovascular control system.* J. Math. Biol. **51** (5) 508–526, 2005. DOI: 10.1007/s00285-005-0339-1

35. **M.J. McGuinness**, Y. Hong, D. Galletly, & P. Larsen. *Arnold tongues in human cardiorespiratory systems.* Chaos **14** (1) pp. 1–6, March 2004.

36. **M.J. McGuinness**, C.P. Please and D.L.S. McElwain *Approximations to the Distributed Activation Energy Model for the Pyrolysis of Coal,* Combustion and Flame **133** pp. 107–117, April 2003.

37. M.J. Davey, K.A. Landman, **M.J. McGuinness** and H.N. Jin. *Mathematical Modeling of Rice Cooking and Dissolution in Beer Production,* AIChE **48** pp. 1811–1826, 2002.

38. **M.J. McGuinness**, K. Landman, J. Trodahl, and A. Pantoja, *Solar radiative heating in first-year sea ice,* Annals of Glaciology, **33** pp. 261–266, 2001. DOI: 10.3189/172756401781818914

39. K.A. Landman & **M.J. McGuinness**, *Modelling the Cooking of a Single Cereal Grain*, Chapter 5 in the book *Modeling: Case Studies from Industry,* editors A.Cumberbatch and A.Fitt, Cambridge University Press, 2001,pp. 97–114.

40. H.J. Trodahl, S.O.F. Wilkinson, **M.J. McGuinness**, & T.G. Haskell. *Thermal conductivity of sea ice: Dependence on temperature and depth*, Geophys. Res. Lett. **28**, pp.1279–1282, 1 April 2001.

41. K.A. Landman & **M.J. McGuinness**, *Mean Action Time for Diffusive Processes,*, Journal of Applied Mathematics and Decision Sciences, **4**(2) (2000) pp.125–141.

42. H.J. Trodahl, **M.J. McGuinness**, P.J. Langhorne, K. Collins, A.E. Pantoja, I.J. Smith and T.G. Haskell. *Heat Transport in McMurdo Sound First Year Fast Ice,* J. Geophys. Res. **105** (2000) pp. 11,347-11,358.

43. **M.J. McGuinness**, C.P. Please, N. Fowkes, P. McGowan, L. Ryder and D. Forte. *Modelling the Wetting and Cooking of a Single Cereal Grain,* The IMA Journal of Mathematics Applied in Business and Industry, **11** (2000) pp. 49-70. Also Research Report 98-28, School of Mathematical and Computing Sciences, Victoria University of Wellington.

44. **M.J. McGuinness**, E. Donskoi and D.L.S. McElwain. *Aymptotic Approximations to the Distributed Activation Energy Model,* Applied Mathematics Letters **12** (1999) pp.27–34.

45. **M.J. McGuinness**, K. Collins, H.J. Trodahl and T.G. Haskell. *Nonlinear Thermal Transport and Brine Convection in First Year Sea Ice,* Annals of Glaciology, **27** (1998) pp.471–476.

46. **M.J. McGuinness**, *Steady Solution Selection and Existence in Geothermal Heat Pipes. II: The Conductive Case,* International Journal of Heat and Mass Transfer, **40** No.2 (1997) pp.311–321. Also Research Report 96-181, Department of Mathematics, Victoria University of Wellington.

47. **M.J. McGuinness**, *Steady Solution Selection and Existence in Geothermal Heat Pipes. I: The Convective Case,* International Journal of Heat and Mass Transfer, **39** No.2 (1996) pp.259–274. Also Research Report 94-139, Department of Mathematics, Victoria University of Wellington.

48. **M.J. McGuinness**, S. White, R. Young, H. Ishizaki, K. Ikeuchi, Y. Yoshida. *A Model of the Kakkonda Geothermal Reservoir,* Geothermics **24** No. 1 1995, pp.1–48.

49. **M.J. McGuinness**, K. Pruess, M. O'Sullivan and M. Blakeley. *Geothermal Heat Pipe Stability: Solution Selection by Upstreaming and Boundary Conditions,* Transport in Porous Media **11** (1993), pp.71–100.

50. **M.J. McGuinness**, *Chaos - A Walk Through The Garden,* New Zealand Science Review **49** (3) 1992, pp.75–78.

51. *Vertical Two-phase Flow in Porous Media,* Transport In Porous Media, **8** 1992, pp.99–131. Co-authors W. Kissling, G. Weir, S. White and R. Young.

52. *Analysis of One-Dimensional Horizontal Two-phase Flow in Geothermal Reservoirs ,* Transport In Porous Media **7** 1991, pp.223–253. Co-authors W. Kissling, A. McNabb, G. Weir, S. White and R. Young.

53. *The Heat Source of the Ruapehu Crater Lake; Deductions from the Energy and Mass Balances,* J. Vulc. and Geophys. Res., **46** 1991, pp.1–20. Co-authors A. Hurst, H. Bibby and B. Scott.

54. *Pressure Transmission in a Bounded Randomly Fractured Reservoir of Single-Phase Fluid,* Transport in Porous Media **1** (1986), 371–397.

55. *A Computation of the Limit Capacity of the Lorenz Attractor,* Physica **16D** (1985), 265–275.

56. *On the Nature of the Torus in the Complex Lorenz Equations,* SIAM J. Applied Math. **44** number 4 (1984), 681–700. Co-author Dr. A. Fowler.

57. *The Fractal Dimension of the Lorenz Attractor,* Physics Letters **99A** (1983), 5–9.

58. *Hysteresis in the Lorenz Equations,* Physics Letters **92A** (1982), 103–105. Co-author Dr. A. Fowler.

59. *Hysteresis, Period Doubling and Intermittency at High Prandtl Number in the Lorenz Equations,* Studies in Applied Math. **69** (1982), 99–126. Co-author Dr. A. Fowler.

60. *A Description of the Lorenz Attractor at High Prandtl Number,* Physica **5D** (1982), 149–181. Co-author Dr. A. Fowler.

61. *The Real and Complex Lorenz Equations in Rotating Fluids and Lasers,* Physica **5D** (1982), 108–121. Co-author Dr. J. D. Gibbon.

62. *The Complex Lorenz Equations,* Physica **4D** (1982), 139–162. Co-authors are Dr. A. Fowler and Dr. J. D. Gibbon.

63. *Amplitude Equations at the Critical Points of Unstable Dispersive Physical Systems,* Proc. Roy. Soc. Lond. **A377** (1981), 185–218. Co-author Dr. J. D. Gibbon.

64. *Derivation of the Lorenz Equations for Some Unstable Dispersive Physical Systems,* Physics Letters **77A** (June 1980), 285–289. Co-author Dr. J. D. Gibbon.

65. *Nonlinear Focussing and the Kelvin-Helmholtz Instability,* Physics Letters **77A** (May 1980), 118–122. Co-author Dr. J. D. Gibbon.

66. *Infinities of Polynomial Conserved Densities for a Class of Nonlinear Evolution Equations,* Journal of Mathematical Physics **21** (1980), 2743–2748.

67. *Noether's Theorem and Infinities of Conserved Densities,* in the proceedings of the meeting on Nonlinear Evolution Equations and Dynamical Systems in the series Lecture Notes in Physics **120** (1980), 363–368.

68. *Infinities of Polynomial Conserved Densities for Nonlinear Evolution Equations,* Journal of Mathematical Physics **21** (1980), 2737–2742.

69. *The Conserved Densities of the Korteweg–de Vries Equation,* Journal of Mathematical Physics **19** (1978), 2285–2288.

Refereed Conference Proceedings

The Mathematics-In-Industry Study Group and the European Study Groups with Industry are one week workshops on actual mathematical modelling problems, with further work done by the moderators to produce a paper that is then refereed before publication in the proceedings. The quality of these MISGs and ESGIs is outstanding on an international scale, and they routinely attract top academics from around the world.

The Geothermal Workshop Proceedings are small papers, typically six to eight typeset pages long, a popular and fast publication method in geothermal modelling. They are refereed, and are an important avenue for dissemination of information in the international geothermal modelling community. There is no duplication of my results published in journals.

1. **Mark J. McGuinness** (2013) The Impact of Varying Wellbore Area on Flow Simulation, paper 200 in *the Proceedings of the 38th Workshop on Geothermal Reservoir Engineering*, Stanford University, Stanford, California, Feb 11–13, 2013. SGP-TR-198. Six pages. `http://www.geothermal-energy.org/pdf/IGAstandard/SGW/2013/Mcguinness.pdf?`

2. A. Rust, A.C. Fowler, **M.J. McGuinness**, S. Mitchell (2010). Convection chimneys in three-phase plasmas (Invited). AGU Fall Meeting Abstracts, 12/2010 .

3. B. Scheu, A. C. Fowler, **M. J. McGuinness**, W. T. Lee, D.B. Dingwell (2010). Revealing the process of fragmentation from high-speed video analysis of rapid decompression of magma. EGU meeting abstracts, 04/2010.

4. B. Scheu, A. C. Fowler, **M. J. McGuinness**, W. T. Lee (2009) Insights into magmatic fragmentation: a revised fragmentation model based on

high-speed video analysis of rapid decompression of magma. AGU Fall Meeting Abstracts 12/2009.

5. A.B. Thompson, G. Richardson, P. Dellar, **M. McGuinness**, & C. Budd, *Arc Phenomena in low-voltage current limiting circuit breakers*, Proceedings of the Sixty-Eighth European Study Group with Industry, held at the University of Southampton, UK, March 30–April 3, 1–17, 2009.

6. B. Anderssen, N. Fowkes, R. Hickson, & **M. McGuinness**, *Analysis of Coil Slumping*, in the proceedings of the 2009 Mathematics and Statistics in Industry Study Group, Institute of Mathematics and Statistics, Eds. T. Marchant, M. Edwards. & G. Mercer, University of Wollongong, Australia, published Jan 2010, pp. 90–108. ISBN: 978-1-74128-181-1

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