Eamonn A. O'Brien

Research Publications

Papers are posted on arXiV or available at `www.math.auckland.ac.nz/~obrien`.

Refereed Journal Articles

1. (with Michael C. Slattery), "Clifford algebras and finite groups", *J. Phys. A: Math. Gen.* **22**, 3159-3160, 1989.

2. (with Rodney James & M.F. Newman), "The groups of order 128", *J. Algebra* **129**, 136-158, 1990.

3. "The p-group generation algorithm", *J. Symbolic Comput.* **9**, 677-698, 1990.

4. "The groups of order 256", *J. Algebra* **143**, 219-235, 1991.

5. (with M.F. Newman), "A computer-aided analysis of some finitely presented groups", *J. Austral. Math. Soc. Ser. A*, **53**, 369–376, 1992.

6. (with E.S. Kramer & S.S. Magliveras), "Some new large sets of t–designs", *Australas. J. Combin.* **7**, 189–193, 1993.

7. "Isomorphism testing for p-groups", *J. Symbolic Comput.* **17**, 133–147, 1994.

8. (with J. Flynn, D. MacHale & R. Sheehy), "Finite groups whose automorphism groups are 2-groups", *Proc. Roy. Irish Acad.* **94A**, (2), 137–145, 1994.

9. (with G. Butler & S.S. Iyer), "A Database of Groups of Prime-Power Order", *Software – Practice and Experience* **24**, (10), 911–951, 1994.

10. (with M.F. Newman & Aner Shalev), "The fixity of groups of prime-power order", *Bull. London Math. Soc.* **27** (2), 225–231, 1995.

11. (with Frank Celler, C.R. Leedham-Green, Scott H. Murray, & Alice C. Niemeyer), "Generating random elements of a finite group", *Comm. Algebra* **23**, 4931–4948, 1995.

12. (with Scott H. Murray), "Selecting Base Points for the Schreier-Sims Algorithm for Matrix Groups", *J. Symbolic Comput.* **19**, 577–584, 1995.

13. (with Derek F. Holt, C.R. Leedham-Green & Sarah Rees), "Testing matrix groups for primitivity", *J. Algebra*, **184**, 795–817, 1996.

14. (with Derek F. Holt, C.R. Leedham-Green & Sarah Rees), "Computing decompositions for modules with respect to a normal subgroup", *J. Algebra*, **184**, 818–838, 1996.

15. (with M.F. Newman), "Application of computers to questions like those of Burnside, II", *Internat. J. Algebra Comput* **6**, 593–605, 1996.

16. (with C.R. Leedham-Green), "Tensor Products are Projective Geometries", *J. Algebra*, **189**, 514–528, 1997.

17. (with C.R. Leedham-Green), "Recognising tensor products of matrix groups", *Internat. J. Algebra Comput.* **7**, 541–559, 1997.

18. (with M.F. Newman), "Classifying 2-groups by coclass", *Trans. Amer. Math. Soc.* **351**, 131-169, 1999.

19. (with Jianbei An), "A local strategy to decide the Alperin and Dade conjectures", *J. Algebra* **206**, 183-207, 1998.

20. (with Bettina Eick), "Enumerating p-groups", *J. Austral. Math. Soc.* **67** (1999), 191-205.

21. (with A.C. Kim and D.L. Johnson), "Certain cyclically presented groups are isomorphic", *Comm. Algebra* **27** (1999), 3531–3536.

22. (with Jianbei An), "The Alperin and Dade conjectures for the Fischer simple group Fi_{23}", *Internat. J. Algebra Comput.* **6** (1999), 621-670.

23. (with D.L. Flannery), "Computing 2-cocycles for central extensions and relative difference sets", *Comm. Algebra*, **28**, 1935-1955, 2000.

24. (with Hans Ulrich Besche and Bettina Eick) "The groups of order at most 2000", *Electron. Research Announc. Amer. Math. Soc.*, **7**, 1-4, 2001.

25. (with Jianbei An), "The Alperin and Dade conjectures for the O'Nan and Rudvalis simple groups", *Comm. Algebra*, **30**, 1305-1348, 2001.

26. (with M.D.E. Conder, C. Maclachlan, and G.J. Martin), "2-generator arithmetic Kleinian groups III", *Math. Scand.* **90**, 161–179, 2002.

27. (with Hans Ulrich Besche and Bettina Eick) "A millennium project: constructing small groups", *Internat. J. Algebra Comput.*, **12**, 623–644, 2002.

28. (with Bettina Eick and C.R. Leedham-Green) "Constructing the automorphism group of a p-group", *Comm. Algebra*, **30**, 2271-2295, 2002.

29. (with M.R. Vaughan-Lee), "The 2-generator restricted Burnside group of exponent 7", *Internat. J. Algebra Comput.*, **12**, 575–592, 2002.

30. (with C.R. Leedham-Green) "Recognising tensor-induced matrix groups", *J. Algebra*, **253**, 2002, 14-30.

31. (with Jianbei An), "Conjectures on the character degrees of the Harada-Norton simple group HN", *Israel J. Math.*, **137**, 157-181, 2003.

32. (with Jianbei An and R.A. Wilson), "The Alperin weight conjecture and Dade's conjecture for the simple group J_4", *LMS J. Comput. Math.*, **6**, 119-140, 2003.

33. (with Jianbei An), "The Alperin and Dade conjectures for the Conway simple group Co_1", *Algebras and Representation Theory*, **7**, 139-158, 2004.

34. (with George Havas and M.F. Newman), "On the efficiency of some finite groups", *Comm. Algebra*, **32**, 649-656, 2004.

35. (with M.F. Newman and M.R. Vaughan-Lee), "Groups and nilpotent Lie rings whose order is the sixth power of a prime", *J. Algebra*, **278**, 383-401, 2004.

36. (with D.L. Flannery), "Linear groups of small degree over finite fields", *Internat. J. Algebra Comput.* **15**, 467-502, 2005.

37. (with Jianbei An), "The Alperin and Dade conjectures for the Fischer simple group Fi_{22}", *Comm. Algebra* **33**, 1529-1557, 2005.

38. (with M.R. Vaughan-Lee), "The groups of order p^7 for odd prime p", *J. Algebra* **292**, 243–258, 2005.

39. (with M.D.E. Conder and C.R. Leedham-Green), "Constructive recognition of PSL(2, q)", *Trans. Amer. Math. Soc.*, **358**, 1203-1221, 2006.

40. (with S.P. Glasby and C.R. Leedham-Green), "Writing projective representations over subfields", *J. Algebra*, 295, 51-61, 2006.

41. (with George Havas, C.R. Leedham-Green and Michael C. Slattery), "Certain Roman and flock generalized quadrangles have nonisomorphic elation groups", *Advances in Geometry*, **6**, 389–395, 2006.

42. (with Carlo M. Scoppola and M.R. Vaughan-Lee) "Not every p-group can be generated by elements of the same order", *Proc. Amer. Math. Soc.* **134**, 3457-3464, 2006.

43. (with Derek F. Holt), "A computer-assisted analysis of some matrix groups", *J. Algebra*, **300**, 199–212, 2006.

44. (with Stefka Bouyuklieva and Wolfgang Willems), "The automorphism group of a binary self-dual doubly-even [72,36,16] code is solvable", *IEEE Trans. Inform. Theory* **52**, 4244-4247, 2006.

45. (with Bettina Eick and M.F. Newman), "The class-breadth conjecture revisited", *J. Algebra*, **300**, 384-393, 2006.

46. (with Martin W. Liebeck), "Finding the characteristic of a group of Lie type", *Journal London Math. Soc.*, **75**, 741–754, 2007.

47. (with F. Lübeck and K. Magaard), "Constructive recognition for $\mathrm{SL}_3(q)$", *J. Algebra*, 2007, **316**, 617–633, 2007.

48. (with John H. Conway and Heiko Dietrich), "Counting groups: gnus, moas and other exotica", *Math. Intelligencer*, **30**, 6–15, 2008.

49. (with Jianbei An, John J. Cannon and W.R. Unger), "The Alperin weight conjecture and Dade's conjecture for the simple group Fi_{24}'", *LMS J. Comput. Math.*, **11**, 100–145, 2008.

50. (with Peter A. Brooksbank), "On intersections of classical groups", *J. Group Theory*, **11**, 465–478, 2008.

51. (with Peter A. Brooksbank), "Constructing the group preserving a system of forms", *Internat. J. Algebra and Comput.*, **18**, 227–241, 2008.

52. (with A. Jaikin-Zapirain and M.F. Newman), "On p-groups having the minimal number of conjugacy classes of maximal size", *Israel J. Math.* **172**, 119–123, 2009.

53. (with Timothy C. Burness and Robert A. Wilson), "Base sizes for sporadic simple groups". *Israel J. Math.* **177**, 307–334, 2010.

54. (with P.E. Holmes, S.A. Linton, A.J.E. Ryba and R.A. Wilson), "Constructive membership in black-box groups", *J. Group Theory* **11**, 747–763, 2008.

55. (with Kay Magaard and Ákos Seress), "Recognition of small dimensional representations of general linear groups", *J. Aust. Math. Soc.* **85**, 229–250, 2008.

56. (with Alberto Cavicchioli and Fulvia Spaggiari), "On some questions about a family of cyclically presented groups", *J. Algebra* **320**, 4063–4072, 2008.

57. (with C.R. Leedham-Green), "Constructive recognition of classical groups in odd characteristic", *J. Algebra* **322**, 833–881, 2009.

58. (with Alla Detinko and Dane Flannery) "Deciding finiteness of matrix groups in positive characteristic", *J. Algebra* **322**, 4151–4160, 2009.

59. (with Martin W. Liebeck, Aner Shalev and Pham Huu Tiep) "The Ore Conjecture". *J. European Math. Soc.* **12**, 939–1008, 2010.

60. (with A. Abdollahi, A. Faghihi, S.A. Linton) "Finite 3-groups of class 3 whose elements commute with their automorphic images", *Arch. Math.* **95**, 1–7, 2010.

61. (with J.N. Bray, M.D.E. Conder and C.R. Leedham-Green), "Short presentations for alternating and symmetric groups", *Trans. Amer. Math. Soc.* **363**, 3277–3285, 2011.

62. (with Martin W. Liebeck, Aner Shalev and Pham Huu Tiep) "Products of squares in finite simple groups", *Proc. Amer. Math. Soc.* **140**, 21–33, 2012.

63. (with Martin W. Liebeck, Aner Shalev and Pham Huu Tiep) "Commutators in quasisimple groups", *Bull. London Math. Soc.* **43**, 1079–1092, 2011.

64. (with Wolfgang Willems) "On the automorphism group of a binary self-dual doubly-even [72,36,16] code", *IEEE Trans. Inform. Theory* **57**, 4445 - 4451, 2011.

65. (with Max Neunhöffer, Felix Noeske, R.A. Wilson) "Orbit invariants and an application to the Baby Monster", *J. Algebra* **341**, 297–305, 2011.

66. (with Alla Detinko and Dane Flannery) "Algorithms for the Tits alternative and related problems", *J. Algebra* **344**, 397–406, 2011.

67. (with Bettina Eick, C.R. Leedham-Green, M.F. Newman) "On the classification of groups of prime-power order by coclass: The 3-groups of coclass 2", *Internat. J. Algebra Comput.* **23**, 1243–1288, 2013.

68. (with Alla Detinko and Dane Flannery) "Recognizing finite matrix groups over infinite fields", *J. Symbolic Comput.* **50**, 100–109, 2013.

69. (with Heiko Dietrich, C.R. Leedham-Green, Frank Lübeck) "Constructive recognition of classical groups in even characteristic", *J. Algebra* **391**, 227-255, 2013.

70. (with Alla Detinko and Dane Flannery) "Algorithms for linear groups of finite rank", *J. Algebra* **393**, 187-196, 2013.

71. (with Sebastian Jambor and Martin W. Liebeck) "Some word maps that are non-surjective on infinitely many finite simple groups", *Bull. Lond. Math. Soc.* **45**, 907–910, 2013.

72. (with Henrik Bäärnhielm, Derek F. Holt, C.R. Leedham-Green) "A practical model for computation with matrix groups", *J. Symbolic Comput.* **68**, 27–60, 2015.

73. (with Arjeh M. Cohen, Sergey Shpectorov) "On the uniqueness of the generalized octagon of order (2,4)", *J. Algebra* **421**, 369–393, 2015.

74. (with Heiko Dietrich, C.R. Leedham-Green) "Effective black-box constructive recognition of classical groups", *J. Algebra* **421**, 460–492, 2015.

75. (with Christopher Voll) "Enumerating classes and characters of p-groups", *Trans. Amer. Math. Soc.* **367**, 7775–7796, 2015.

76. (with Martin W. Liebeck) "Recognition of finite exceptional groups of Lie type", *Trans. Amer. Math. Soc.*, **368**, 6189–6226, 2016.

77. (with Joanna Fawcett and Jan Saxl) "Regular orbits of symmetric and alternating groups", *J. Algebra* **458**, 21–52, 2016.

78. (with Petr Vojtěchovský) "Code loops in dimension at most 8", *J. Algebra*, **473**, 607–626, 2017.

79. (with Samuel Gonshaw and Martin W. Liebeck) "Unipotent class representatives for finite classical groups", *J. Group Theory*, **20**, 505–525, 2017.

80. (with Robert M. Guralnick, Martin W. Liebeck, Aner Shalev and Pham Huu Tiep) "Surjective word maps and Burnside's p^aq^b theorem", *Invent. Math.* **213**, 589–695, 2018.

81. (with Joanna Fawcett, Jürgen Muller and R.A. Wilson) "Regular orbits of sporadic simple groups", *J. Algebra* **522**, 61–79, 2019.

82. (with Peter A. Brooksbank and James B. Wilson) “Testing isomorphism of graded algebras", *Trans. Amer. Math. Soc.* **372**, 8067-8090, 2019.

83. (with Bettina Eick and Tommy Hofmann) “The conjugacy problem in $\mathrm{GL}(n,\mathbb{Z})$", *J. Lond. Math. Soc.* **100**, 731-756, 2019.

84. (with C.R. Leedham-Green) “Presentations on standard generators for classical groups", *J. Algebra* **545**, 324-390, 2020.

85. (with C.R. Leedham-Green and Derek Holt) “Constructing composition factors for a linear group in polynomial time", *J. Algebra* **361**, 215–236, 2020.

86. (with Leyli Jafari and Stefan Kohl) “Automorphism group orbits on finite simple groups", *Comm. Algebra* **49**, 3294–3300, 2021.

87. (with Z. Bácskai and D.L. Flannery) “Classifying finite monomial linear groups of prime degree in characteristic zero", *Internat. J. Algebra Comput.* **31**, 1547–1585, 2021.

88. (with I. Ponomarenko, A.V. Vasil’ev and E. Vdovin) “The 3-closure of a solvable permutation group is solvable", *J. Algebra* **607**, 618–637, 2022.

89. (with M. Avitabile, A. Caranti, N. Gavioli, V. Monti, and M.F. Newman) “Thin subalgebras of Lie algebras of maximal class", *Israel J. Math.* **253**, 101–112, 2023.

90. (with Anastasia Hadjievangelou, Patrizia Longobardi, Mercede Maj, Carmine Monetta, and Gunnar Traustason) “Left 3-Engel elements in groups: A survey", *J. Iran. Math. Soc.* **4**, 207–234.

91. (with Sunil Prajapati and Ayush Udeep) “Minimal degrees for faithful permutation representations of groups of order p^6 where p is an odd prime", *J. Algebraic Combin.* **60**, 319–388, 2024.

92. (with Sunil Prajapati and Ayush Udeep) “Exceptional groups of order p^6 for primes $p \geq 5$", *Bull. Aust. Math. Soc.* **112** (2025), 485–496.

93. (with Peter A. Brooksbank, Heiko Dietrich, Joshua Maglione, and James B. Wilson) “Categorification of characteristic structures", *Forum Math. Sigma* **14** (2026), Paper No. e13, 1–46.

94. (with Jiyong Chen, Melissa Lee, Đorđe Mitrović and Binzhou Xia) “Elusive groups from non-split extensions", *J. Pure Appl. Algebra* **230**, 2026.

95. (with Mima Stanojkovski), “Geometric invariants for p-groups of class 2 and exponent p", *J. Algebra*, 2026.

Books

1. Derek F. Holt, Bettina Eick and E.A. O’Brien, “Handbook of Computational Group Theory", CRC Press, 515 pages, 2005.

2. Giovanni De Franceschi, Martin W. Liebeck and E.A. O'Brien, "Conjugacy in Finite Classical Groups", Springer Monogr. Math., 2025. xi+174 pp.

Articles appearing in Refereed Conference Proceedings

1. (with M.F. Newman), "A CAYLEY library for the groups of order dividing 128", *Group Theory* (Singapore, 1987), pp. 437-442, 1989. Walter de Gruyter, Berlin, New York.

2. "Computing automorphism groups of p-groups", *Computational Algebra and Number Theory* (Sydney, 1992), pp. 83–90, 1995. Kluwer Academic Publishers, Dordrecht.

3. (with George Havas & M.F. Newman), "Groups of deficiency zero", *Geometric and Computational Perspectives on Infinite Groups*, Amer. Math. Soc. DIMACS Series, **25**, (DIMACS, 1994), pp. 53–67, 1995.

4. (with Bettina Eick), "The groups of order 512", *Algorithmic algebra and number theory* (Heidelberg, 1997), pp. 379–380, Springer, Berlin, 1999.

5. "Towards effective algorithms for linear groups", *Finite Geometries, Groups and Computation*, (Colorado), pp. 163-190. De Gruyter, Berlin, 2006.

6. (with George Havas, C.R. Leedham-Green and Michael C. Slattery), "Computing with elation groups", *Finite Geometries, Groups and Computation*, (Colorado), pp. 95-102. De Gruyter, Berlin, 2006.

7. "Algorithms for matrix groups", Groups St Andrews 2009 in Bath, LMS Lecture Notes **388**, 297–323, 2011.

8. (with Thomas Breuer and Gunter Malle), "Reliability and reproducibility of Atlas information", *Finite Simple Groups: Thirty Years of the Atlas and Beyond*, AMS Contemporary Mathematics **694**, 21–32, 2017.

9. (with Levent Alpöge, Nicholas M. Katz, Gabriel Navarro, and Pham Huu Tiep) "Local systems and Suzuki groups", Contemp. Math., **800**, Israel Math. Conf. Proc. American Mathematical Society, RI, 2024, 15–79.

Invited Chapters in Books

1. (with Werner Nickel, Alice C. Niemeyer and M.F. Newman), "ANU Polycyclic Quotients", invited contribution in *Computer Algebra Handbook: Foundations, Applications, Systems*, Springer-Verlag, pp. 459-460, 2002.

Scholarly reviews

1. 101 published reviews of mathematical papers in *Mathematical Reviews*.

2. Invited review of "A generating function approach to the enumeration of matrices in classical groups over finite fields", by Fulman, Neumann, Praeger; *Gazette Australian Math. Soc*, **34**, 2007, 115–117.

3. Invited reviews of “Groups of prime power order. Volumes 1 and 2", “Groups of prime power order. Volume 3", and “Groups of prime power order. Volume 4", by Yakov Berkovich & Zvonimir Janko; *Mathematical Reviews*, 2009 / 12 / 16.

Work in other media

Writer of software incorporated into the two leading computational algebra, systems GAP and MAGMA. Contributions include:

- Software to compute power-conjugate presentations for p-quotients of finitely-presented groups; compute extensions of p-groups; automorphism groups; decide whether two presentations determine isomorphic p-groups.
- Software for work with linear groups; includes finding decomposition of a matrix group with respect to a normal subgroup; investigating whether such groups are primitive; deciding tensor decompositions.
- Software for random element generation and selecting base points for matrix groups.
- Libraries of data on p-groups and groups of small order.