Eamonn A. O'Brien

Research Publications

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

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.
- (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.
- (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.
- (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.
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- 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.
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- 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.
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- 51. (with Peter A. Brooksbank), "Constructing the group preserving a system of forms", *Internat. J. Algebra and Comput.*, **18**, 227–241, 2008.
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- (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.
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- 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 doublyeven [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.
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- (with Alla Detinko and Dane Flannery) "Algorithms for linear groups of finite rank", J. Algebra 393, 187-196, 2013.
- (with Sebastian Jambor and Martin W. Liebeck) "Some word maps that are nonsurjective 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.
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- 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 $GL(n, \mathbb{Z})$ ", *J. London 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.
- (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 $p \ge 5$ ", Bull. Austral. Math. Soc., 2025.

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.

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.

- (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. 94 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.

Other publications

- 1. "A computer based description of 2-groups", Gazette Austral. Math. Soc. 15, 1-5, 1988.
- 2. "Providing electronic access to group descriptions", SIGSAM Bulletin 25, 52-56, 1991.

- 3. (with M.F. Newman), "The Wielandt length of some 3-groups", SIGSAM *Bulletin* **25**, 50-51, 1991.
- 4. (with G. Butler & S.S. Iyer), "TwoGroups: A Database for Group-Theory", In "Computers in Mathematics" column of *Notices Amer. Math. Soc.* **40**, 839-841, 1993.
- 5. "The matrix recognition project", Oberwolfach Report No. 30, 2006.

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.