MORITA EQUIVALENCE CLASSES OF PRINCIPAL BLOCKS WITH ELEMENTARY ABELIAN DEFECT GROUPS OF ORDER 64[1]

Cesare Giulio Ardito

We classify the Morita equivalence classes of principal blocks with elementary abelian defect groups of order 64 with respect to a complete discrete valuation ring with an algebraically closed residue field of characteristic two.

Keywords: Donovan's conjecture, finite groups, Morita equivalence, block theory, modular representation theory.

REFERENCES

1. Alperin J.L. *Local representation theory*. Ser. Cambridge Studies in Advanced mathematics, vol. 11. Cambridge: Cambridge University Press, 1986, 178 p. ISBN: 0521306604 .

2. Ardito C.G. Morita equivalence classes of blocks with elementary abelian defect groups of order 32. 2019. 32 p. Available on *arXiv*:1908.02652 .

3. Ardito C.G. Blocks with an elementary abelian defect group in characteristic two, PhD Thesis, University of Manchester, 2020. 256 p.

4. Boltje R., Kessar R., Linckelmann M. On Picard groups of blocks of finite groups. *J. Algebra*, 2020, vol. 558, pp. 70–101. doi: 10.1016/j.jalgebra.2019.02.045 .

5. Bosma W., Cannon J.J., Fieker C., Steel A. *Handbook of Magma functions, edition 2.16*. 2010.

6. Craven D., Eaton C.W., Kessar R. and Linckelmann M. The structure of blocks with a Klein four defect group. *Math. Z.*, 2011, vol. 268, no. 1, pp. 441–476.

7. Craven D., Rouquier R. Perverse equivalences and Broué's conjecture. *Advances in Mathematics*, 2013, vol. 248, pp. 1–58. doi: 10.1016/j.aim.2013.07.010 .

8. Eaton C.W., Kessar R., Külshammer B.K and Sambale B. 2-blocks with abelian defect groups. *Advances in Mathematics*, 2014, vol. 254, pp. 706–735. doi: 10.1016/j.aim.2013.12.024 .

9. Eaton C.W. Morita equivalence classes of 2-blocks of defect three. *Proc. American Math. Soc.*, 2016, vol. 144, pp. 1961–1970.

10. Eaton C.W. Morita equivalence classes of blocks with elementary abelian defect groups of order 16. 2017. 17 p. Available on *arXiv*:1612.03485 .

11. Eaton C.W., Livesey M. Some examples of Picard groups of blocks. *J. Algebra*, 2020, vol. 558, pp. 350–370. doi: 10.1016/j.jalgebra.2019.08.004 .

12. Eaton C.W., Livesey M. Donovan's conjecture and blocks with abelian defect groups. *Proc. American Math. Soc.*, 2019, vol. 147, no. 3, pp. 963–970. doi: 10.1090/proc/14316 .

13. Eaton C.W., Eisele F., Livesey M. Donovan's conjecture, blocks with abelian defect groups and discrete valuation rings. *Math. Z.*, 2020, vol. 295, no. 1, pp. 249–264. doi: 10.1007/s00209-019-02354-1 .

14. Eaton C.W. et al. *Block library* [e-resource]. 2019. Available on https://wiki.manchester.ac.uk/blocks/+ .

15. Eisele F. On the geometry of lattices and finiteness of Picard groups. 2019. 12 p. Available on *arXiv*:1908.00129 .

16. Erdmann K. Blocks whose defect groups are Klein four groups: a correction. *J. Algebra*, 1982, vol. 76, no. 2, pp. 505–518. doi: 10.1016/0021-8693(82)90228-9 .

17. Fong P., Harris M.E. On perfect isometries and isotypies in finite groups. *Invent Math.*, 1993, vol. 114, no. 1, pp. 139–191. doi: 10.1007/BF01232665 .

18. Kessar R., Koshitani S., Linckelmann M. Conjectures of Alperin and Broué for 2-blocks with elementary abelian defect groups of order 8. *Journal für die reine und angewandte Mathematik*, 2012, vol. 671, pp. 85–130. doi: 10.1515/CRELLE.2011.162 .

19. Külshammer B. Crossed products and blocks with normal defect groups. *Communications in Algebra*, 1985, vol. 13, pp. 147–168. doi: 10.1080/00927878508823154 .

20. Külshammer B. Donovan's conjecture, crossed products and algebraic group actions. *Israel J. Math.*, 1995, vol. 92, no. 1, pp. 295–306. doi: 10.1007/BF02762084 .

21. Külshammer B., Puig L. Extensions of nilpotent blocks. *Invent. Math.*, 1990, vol. 102, pp. 17–71. doi: 10.1007/BF01233419 .

22. Linckelmann M. The source algebras of blocks with a Klein four defect group. *J. Algebra*, 1994, vol. 167, no. 3, pp. 821–854. doi: 10.1006/jabr.1994.1214 .

23. Linckelmann M. *The block theory of finite group algebras, vol. 1 and 2.* London Mathematical Society Student Texts, vol. 91–92. Cambridge: Cambridge University Press, 2018. 1114 p. ISBN: 978-1108441902 .

24. Linckelmann M. On automorphisms and focal subgroups of blocks. In: Carlson J., Iyengar S., Pevtsova J. (eds), *Geometric and Topological Aspects of the Representation Theory of Finite Groups*, 2018, Springer Proceedings in Mathematics & Statistics, vol. 242, Cham: Springer, pp. 235–249.
doi: 10.1007/978-3-319-94033-5_9 .

25. Livesey M. On Picard groups of blocks with normal defect groups. 2019. 28 p. Available on *arXiv*:1907.12167 .

26. McKernon E. 2-Blocks whose defect group is homocyclic and whose inertial quotient contains a Singer cycle. *J. Algebra*, 2020, vol. 563, pp. 30–48. doi: 10.1016/j.jalgebra.2020.06.029 .

27. Murai M. On blocks of normal subgroups of finite groups. *Osaka J. Math.*, 2013, vol. 50, pp. 1007–1020.

28. Puig L. Nilpotent blocks and their source algebras. *Invent. Math.*, 1988, vol. 93, no. 1, pp. 77–116. doi: 10.1007/BF01393688 .

29. Puig L., Usami Y. Perfect isometries for blocks with abelian defect groups and Klein four inertial quotients. *J. Algebra*, 1993, vol. 160, no. 1, pp. 192–225. doi: 10.1006/jabr.1993.1184 .

30. Puig L. Nilpotent extensions of blocks. *Math. Z.*, 2011, vol. 269, no. 1, pp. 115–136.
doi: 10.1007/s00209-010-0718-1 .

31. Usami Y. Perfect isometries for principal Blocks with abelian defect groups and elementary abelian 2-inertial quotients. *J. Algebra*, 1997, vol. 196, no. 2, pp. 646–681. doi: 10.1006/jabr.1997.7094 .

32. Ward H.N. On Ree's series of simple groups. *Transactions American Math. Soc.*, 1966, vol. 121, no. 1, pp. 62–89. doi: 10.2307/1994333 .

33. Walter J.H. The characterization of finite groups with abelian Sylow 2-subgroups. *Annals Math.*, 1969, vol. 89, no. 3, pp. 405–514. doi: 10.2307/1970648 .

34. Zhou Y. On the p'–extensions of inertial blocks. *Proc. American Math. Soc.*, 2016, vol. 144, no. 1, pp. 41–54. doi: 10.1090/proc/12691 .

Cesare Giulio Ardito, Department of Mathematics, City University of London, Northampton Square, London, EC1V 0HB, United Kingdom, email: cesareg.ardito@gmail.com .