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Generation of simple groups. (English) Zbl 0601.20013
J. Algebra 103, 381-401 (1986).

The main results of this paper are: Theorem A. Any finite nonabelian simple group can be generated by an involution and a Sylow 2-subgroup. - Theorem B. Let G be a finite group and K a field of characteristic p . If G acts faithfully on the irreducible KG -module V , then $\dim H^1(G, V) \leq (2/3) \dim V$. - Theorem C. Let G be a finite group of even order. Let $O(G)$ be the maximal normal subgroup of G of odd order, and set $\bar{G} = G/O(G)$. Then either G has a maximal subgroup of even index or $A = O_2(\bar{G}) = \Phi(\bar{G})$ and $G/A \cong A_7$. - Theorem D. Let p be a prime and G a finite group. Then $G = \langle P, R \rangle$ for some p -subgroup P and p' -subgroup R .

The proofs of these results invoke the classification of finite simple groups. Various consequences of these results improve and extend work of several authors.

Reviewer: [M.E.Harris](#)

MSC:

20D06 Simple groups: alternating groups and groups of Lie type
20F05 Generators, relations, and presentations of groups

Cited in **18** Documents

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[involution](#); [Sylow 2-subgroup](#); [classification of finite simple groups](#)

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References:

- [1] Aschbacher, M., A characterization of Chevalley groups over fields of odd order, Ann. of math., 106, 353-468, (1977) · [Zbl 0393.20011](#)
- [2] Aschbacher, M., Overgroups of Sylow subgroups in sporadic groups, Mem. amer. math. soc., 343, (1986) · [Zbl 0585.20005](#)
- [3] Aschbacher, M.; Guralnick, Solvable generation of groups and Sylow subgroups of the lower central series, J. algebra, 77, 189-201, (1982) · [Zbl 0485.20012](#)
- [4] Aschbacher, M.; Guralnick, R., Some applications of the first cohomology group, J. algebra, 90, 446-460, (1984) · [Zbl 0554.20017](#)
- [5] Bloom, D., The subgroups of $\text{PSL}_3(q)$ for odd q , Trans. amer. math. soc., 127, 150-178, (1967) · [Zbl 0153.03702](#)
- [6] Brauer, R., On the relation between the orthogonal group and the unimodular group, Arch. rational mech. anal., 18, 97-99, (1965) · [Zbl 0134.26401](#)
- [7] Butler, G., The maximal subgroups of the sporadic simple group of held, J. algebra, 69, 189-201, (1981)
- [8] Cooperstein, B., The geometry of root subgroups in exceptional groups, II, Geom. dedicata, 8, 317-381, (1979) · [Zbl 0443.20005](#)
- [9] Curtis, C.; Kantor, W.; Seitz, G., The 2-transitive permutation representations of the finite Chevalley groups, Trans. amer. math. soc., 218, 1-59, (1976) · [Zbl 0374.20002](#)
- [10] Gorenstein, D., Finite simple groups: an introduction to their classification, (1982), Plenum New York · [Zbl 0483.20008](#)
- [11] Gorenstein, D.; Lyons, R., The local structure of finite groups of characteristic 2 type, Mem. amer. math. soc., 276, (1983) · [Zbl 0519.20014](#)
- [12] Gruenberg, K., Cohomologic topics in group theory, () · [Zbl 0205.32701](#)
- [13] Gruenberg, K., Relation modules of finite groups, () · [Zbl 0111.02804](#)
- [14] Guralnick, R., Subgroups of prime power index in a simple group, J. algebra, 81, 304-311, (1983) · [Zbl 0515.20011](#)
- [15] Jones, W.; Parshall, B., On the 1-cohomology of finite groups of Lie type, () · [Zbl 0345.20046](#)
- [16] {scW. Kantor}, Primitive permutation groups of odd degree, and an application to finite projective planes, preprint. · [Zbl 0606.20003](#)
- [17] Kimmerle, W., On the generation gap of a finite group, J. pure appl. algebra, 36, 253-271, (1985) · [Zbl 0594.20004](#)
- [18] Linnell, P.A., A cancellation theorem for lattices over an order, J. London math. soc., 31, 450-456, (1985) · [Zbl 0592.20003](#)
- [19] Noll, W., Proof of the maximality of the orthogonal group in the unimodular group, Arch. rational mech. anal., 18, 100-102,

(1965) · [Zbl 0161.02501](#)

[20] Steinberg, R., Lectures on Chevalley groups, Yale lecture notes, (1967), Yale

[21] Wielandt, H., Finite permutation groups, (1964), Academic Press New York · [Zbl 0138.02501](#)

[22] Wilson, R., The geometry and maximal subgroups of the simple groups of A. ruivalis and J. Tits, (), 533-563 · [Zbl 0507.20013](#)

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