University of Birmingham

Professor Paul Flavell MA, DPhil

Head of School
Professor of Algebra

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About

Paul Flavell is Professor of Algebra and Head of School in the School of Mathematics.

Paul is pursuing an active research programme in the field of Abstract Algebra, the outcomes of which are published in mathematical journals. He has received funding from the Leverhulme Trust.

Paul has numerous international links and has spent much time abroad, particularly in Germany. He is frequently invited to give talks on his research, both nationally and internationally.

School web page: **web.mat.bham.ac.uk/P.J.Flavell (http://web.mat.bham.ac.uk/P.J.Flavell)**

Qualifications

- DPhil(Oxford) in Mathematics 1990
- Part III of the Cambridge Mathematical Tripos, 1986
- MA(Cambridge) in Mathematics, 1985

Biography

Paul Flavell qualified with a MA(Hons) in Mathematics from Cambridge University in 1985. He obtained a Distinction in Part III of the Cambridge Mathematical Tripos in 1986. There followed a move to Oxford University where he obtained his DPhil in 1990.

Paul has been employed at the University of Birmingham since 1990, first as Lecturer and currently as Professor of Algebra. He has made numerous trips abroad including extended visits to the University of Kiel, Germany.

Teaching

- Single Honours Mathematics (G100, G103, G141)
- Mathematics Majors: Mathematics with Business Management (G1N2); Mathematics with Engineering (J920); Mathematics with Philosphy (G1V5)
- Joint Honours Mathematics: Mathematics & Computer Science (GG14); Pure Mathematics & Computer Science (GGC4); Mathematics & Sport Science (GC17); Mathematics & Music (GW13); Mathematics & Philosophy (GV15)
- Theoretical Physics and Applied Mathematics (FG31)
- Mathematics Minors: French Studies and Mathematics (GR11); German Studies and Mathematics (GR12)
- Natural Sciences (CFG0, FCG0)

Postgraduate supervision

Paul is interested in supervising doctoral research students in the following areas:

- Abstract Finite Group Theory
- The theory of Finite Solvable Groups and associated Representation Theory

PhD opportunities

Research

Paul's main area of research is Group Theory, which is an area of Abstract Algebra. In very general terms, groups are used to measure the abstract notion of symmetry. As a consequence, they appear in very many areas of science as well as being fascinating objects of study from the pure mathematical point of view.

There are two themes to Paul's research. Firstly, the further development of the abstract theory of finite groups. Secondly, participation on the ongoing international project

to produce a new and simplified proof of the Classification Theorem for the Finite Simple Groups.

In the abstract theory of finite groups, the theory of Automorphisms of Finite Groups presents many formidable challenges and opportunities to considerably extend existing theory. For example Paul's Hall-Higman-Shult type theorem for arbitrary finite groups is a generalization of classical theorems regarding representations of solvable groups to nonsolvable groups. As an application, Paul has obtained a local version of Thompson's Thesis, which relates the structure of the fixed point subgroup of an automorphism to that of the whole group.

Paul has developed a substantial theory concerning automorphisms. In particular, relating local structure to global structure. Further high points of this work to date are new proofs of the Solvable and Nonsolvable Signalizer Functor Theorems. These results are two of the pillars on which both the first generation and second generation Gorenstein-Lyons-Solomon proofs of the Classification Theorem of the Finite Simple Groups are built.

Another long standing interest is Generation Properties of Finite Groups. A highlight of this work is Paul's short and direct proof that a finite group is solvable if and only if every pair of its elements generate a solvable subgroups. This result had previously been obtained by Thompson as a corollary of his monumental classification of the Minimal Simple Groups.

Publications

Flavell, P. (2010), Primitive pairs of p-solvable groups. J. Algebra 324, no. 4, 841-859.

Flavell, P. (2010), On Wielandt's Theory of Subnormal Subgroups, Bull. Lond. Math. Soc. 42, no. 2, 263-266.

Flavell, P. (2010), RC(R)-Signalizers in Finite Groups, J. Algebra, 323, no. 7, 1982-1992.

Flavell, P., Guest, S., Guralnick, R. (2010) Characterizations of the Solvable Radical, Proc. Amer. Math. Soc. 138, no. 4, 1161-1170.

Flavell, P. (2006), Automorphisms and Fusion in Finite Groups, J. Algebra, no. 2, 472-479.

Flavell, P. (2006), A Hall-Higman-Shult type theorem for arbitrary finite groups, Invent. Math., 164, no. 2, 361-397.

Flavell, P. (2002), An equivariant analogue of Glauberman's ZJ-Theorem, J. Algebra 257, no. 2, 249-264.

Flavell, P. (2002) On the Fitting height of a soluble group that is generated by a conjugacy class, J. London Math. Soc., (2) 66, no. 1, 101-113.

Flavell, P. (1995) Finite groups in which every two elements generate a soluble subgroup, Invent. Math., no. 2, 279-285.

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