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Algebra and Number Theory Seminar

Henk Hollmann (Philips Research Laboratories)

will speak on

Linear recurring sequence subgroups and automorphisms of cyclic codes

Mon 14th April 2008 at 4:00PM

Location: Mathematical Sciences Seminar Room

Let $q = p^r$ be a prime power, and let $f(x) = x^m - f_{m-1}x^{m-1} - \dots - f_1x - f_0$ be an irreducible polynomial over the finite field $GF(q)$ of size q . A zero α of f is called nonstandard if the recurrence relation $u_m = f_{m-1}u_{m-1} + \dots + f_1u_1 + f_0u_0$ can generate the powers of α in a nontrivial way, that is, with $u_0 = 1$ and $f(u_1) \neq 0$. In 2003, Brison and Nogueira asked for a characterisation of all nonstandard cases in the case $m = 2$, and solved this problem for q a prime. The problem is still open for $m = 2$ and general q .

In this talk, we first relate this classification problem to the problem of determining which cyclic codes over $GF(q)$ possess extra permutation automorphisms.

Then we discuss two classes of examples of nonstandard finite field elements. Finally, we use the known classification of the subgroups of $PGL(2, q)$ in a first step towards showing that these examples exhaust all possibilities in the case where $m = 2$.

This talk is part of the **Algebra and Number Theory** series. For more, see <https://maths.ucd.ie/seminars>