Algebra and Number Theory Seminar

Title: Linear recurring sequence subgroups and automorphisms of cyclic codes

Speaker: Henk Hollmann (Philips Research Laboratories)

Date: Mon 14th April 2008 at 4:00PM

Location: Mathematical Sciences Seminar Room

Abstract: Let $q = p^r$ be a prime power, and let $f(x) = x^m - f_{m-1}x^{m-1} - cdots - f_1x - f_0$ be an irreducible polynomial over the finite field $GF(q)$ of size q. A zero xi of f is called em nonstandard/ if the recurrence relation [u$_m = f_{m-1}u_{m-1} + cdots + f_1u_1 + f_0u_0]cangeneratethepowersofxiinanontrivialway, thatis, withu_0 = 1$ and $f(u_1)eq0$. 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 $m = 2$.